ZK 246

TAPE RECORDER SERVICE MANUAL

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POLAND
WHZ–ZRD-05-3843/72 PRINTED IN POLAND

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TECHNICAL AND PERFORMANCE DATA
(as per Specifications)

It.	Parameter	ZK-246
1	Tape Speed	19.05/9.53 cm/s
2	Number of tracks	4
3	Frequency range	
	Speed 9.5 cm/s	40—16000 c/s
	Speed 19.05 cm/s	40—18000 c/s
4	Maximum reel diameter	180 mm
5	Playback time of a complete 26 μ tape reel	2—4 hours — stereo 4—8 hours — mono
6	Signal-to-noise ratio	
	Speed 9.5 cm/s	≧45 dB
	Speed 19.05 cm/s	≧48 dB
7	Erasure effectiveness	65 dB
8	Crosstalk attenuation	30 dB stereo 40 dB mono
9	Transistors	2×BC109 12×BCP108 5×BCP107 2×BC177 2×TG70 complementary pair
10	Diodes	BZ11D1 2×BZ11C3V3 BZ11C10 2×DOG56 2×DOG58 2×BA561
11	Inputs:	
	microphone	2×(0.12÷3 mV) 5 kΩ
	radio	2×(5÷100 mV) 47 kΩ
	record player	2×(0.1÷3 V) 910 kΩ
12	Input selecting switch	radio — micro
13	Outputs:	
	radio	≧2×0.3 V/R_{out} 5 kΩ
	earphones	2×0.6 V/R_{loat} 10 kΩ
	add. amplifier	—
	loudspeaker	2×5 Ω (4÷8) Ω
14	Power output:	
	at h=2%	2×3 W
	at h=5%	2×5 W
15	Music power output	2×10 W
16	Built-in loudspeakers	2×GD14.5/9.5/3,5 Ω
17	Tape Speed non-uniformity	
	Speed 9.5 cm/s	≦0.2%
	Speed 19.05 cm/s	≦0.15%
18	26 μ tape rewinding time	240 s
19	Monitoring while recording	+
20	Quick stop	+
21	Synchronous recording (playback)	+
22	Multiplayback	+
23	Recording level indicator	+
24	Position indicator	+
25	Tape end stop	+
26	Switching off by means of speed control in pos. "0"	+
27	Possibility of operation in horizontal as well as vertical positions	+
28	Supply	220 V, 50 c/s (Hz)
29	Power consumption	80 W
30	Dimensions	440×340×170 mm
31	Weight	12 kg approx.

I. MECHANICAL PART

1. GENERAL

For general view of Stereo Tape Recorder ZK-246 see Fig. 1.

Prior to any attempt for dismantling Tape Recorder remember that:

— all the red varnish-sealed screws required to be removed or undone during the disassembly stage must be secured again with varnish in their position after fitting,

— all the lock washers, unless otherwise stated, must be mounted so as to have axial clearance within 0.1—0.2 mm,

— clean working surfaces of the rubber elements add to a better performance and reliability of the mechanical system. It is, therefore, advisable that they are periodically cleaned with the use of extraction naphta,

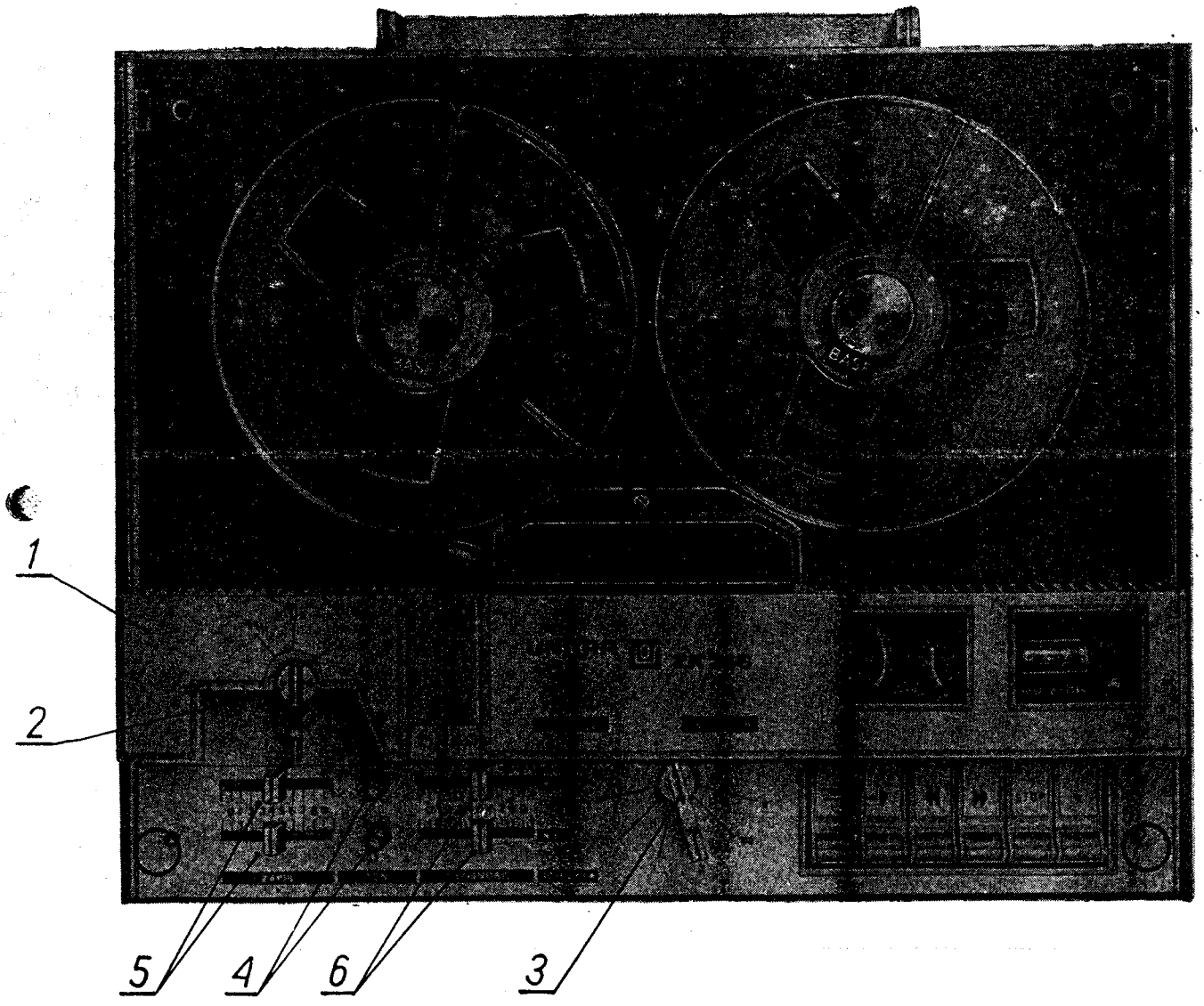


Fig. 1

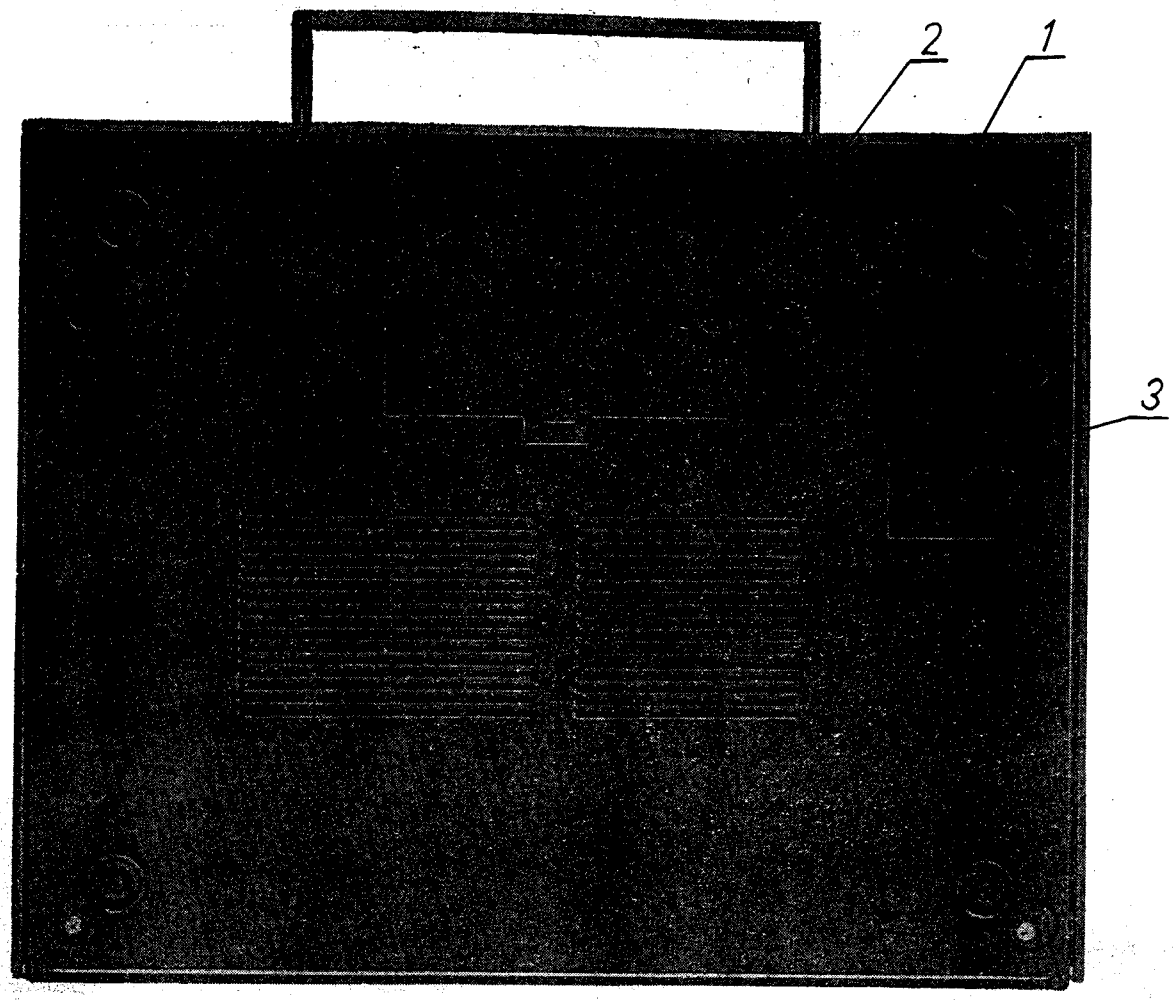


Fig. 2

— should it be found necessary to rebond any components broken or damaged, take care that polystyrene is always joined with another piece of polystyrene by means of such solvents as e. g. toluene,
— pieces of different plastics materials, metal-plastics bonds or pieces of different metals will require the use of Butapren OBT III adhesive (trade name),
— in order to replace a fuse it is necessary to shift the cover as directed by the arrow (Fig. 2).

2. DISASSEMBLY AND REASSEMBLY PROCEDURES

When proceeding to a repair or inspection follow the procedure as below:
— remove the top cover (1) along with accessories mounted thereon.
To do this, undo five screws as markedin Fig. 1, then remove the speed control knob (2), the mode selector knob (3), the potentiometer knobs (4) and the tape spools,
— remove the bottom cover (1).
To do this, undo four screws as marked in Fig. 2 and then remove the mains lead through the opening in the lead holding compartment (2),

— as a further step, disconnect the chassis comprising circuitry (1) along with the transformer from the mechanism (2) by undoing four screws as marked in Fig. 3,
— undo four screws which connect the mechanism plate (1) with the wooden frame (2) (refer to Fig. 4), straighten the bends of the handle (3) clamps, remove the handle, and then remove the mechanism out from the frame.
Note: When dismantling, disconnect the connection sockets and desolder the motor and loudspeaker leads. Do not undo without any serious reason the four screws holding down the bridge with heads and do not separate the small frame from the supporting plate as shown in Fig. 3 and 4. Each time such dismantling is done, it is necessary to carry out readjustment and realignment anew.

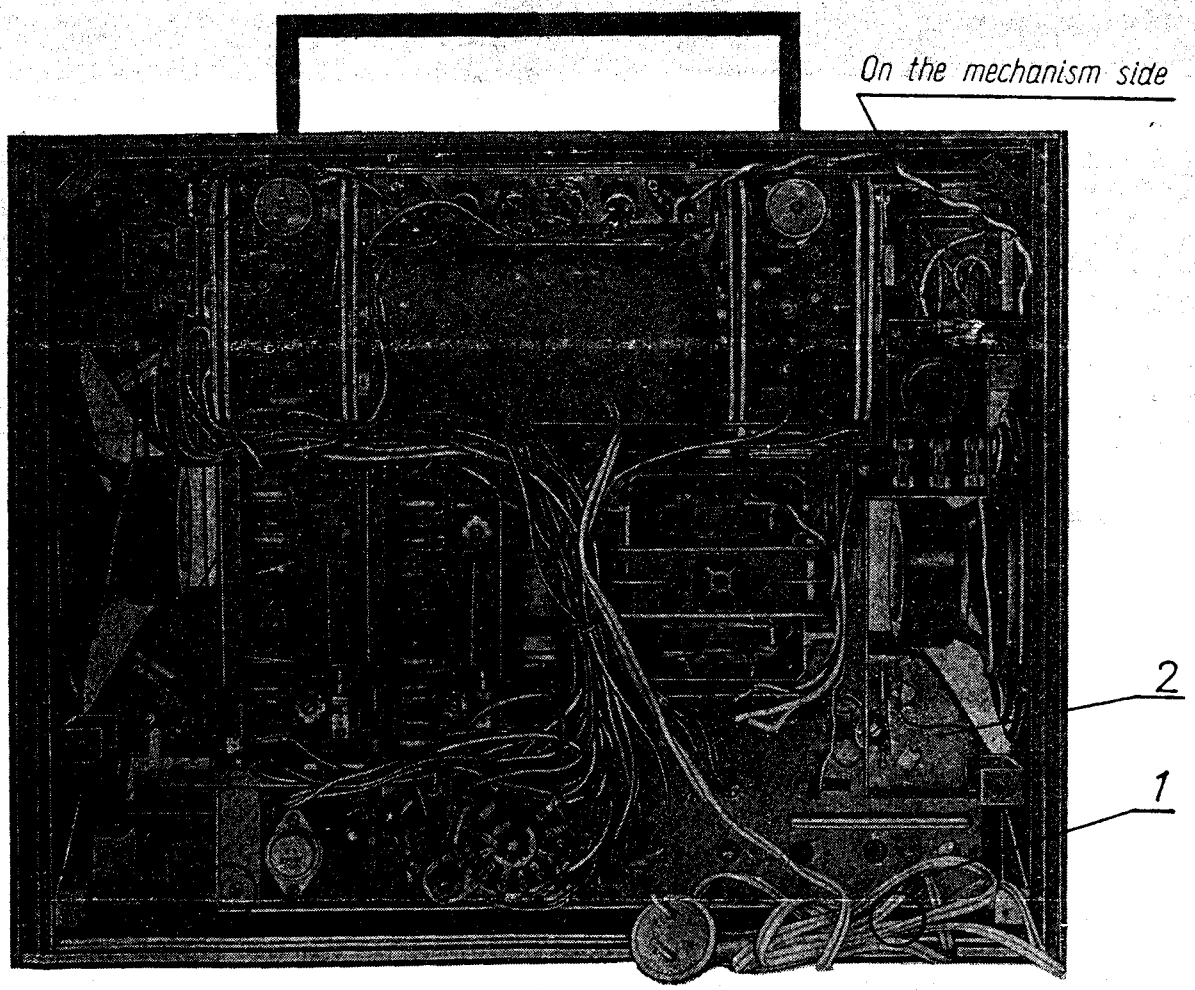


Fig. 3

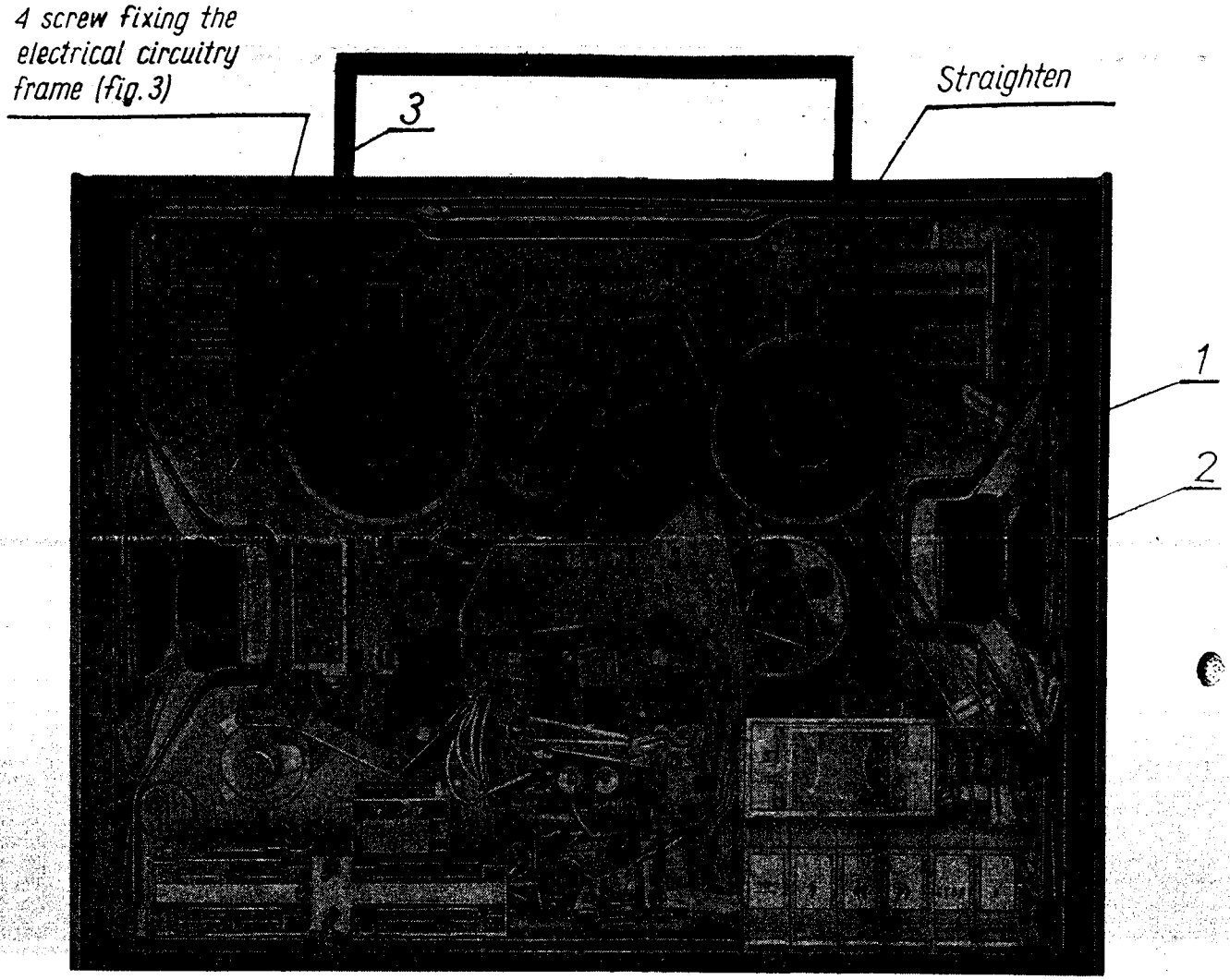


Fig. 4

2.1. Replacement of Winding and Counter Belts

To replace the winding belt (1), undo the screw (2), deflect the flat spring (3) and take the belt out from the pulleys (4 and 5).
As for the counter belt, this may be replaced without any disassembling operation — simply take the belt out from the counter pulley and from the r.h. disk.

2.2. Replacement of Pushbuttons

To replace any pushbutton in the main switch assembly, disengage the pushbutton from the return spring (except the "START" pushbutton) and move the pusher to the inside (except the pushbuttons "STOP" and "RECORDING"). Now, withdraw the split pin from the switch shaft, draw the shaft out and remove the pushbutton.

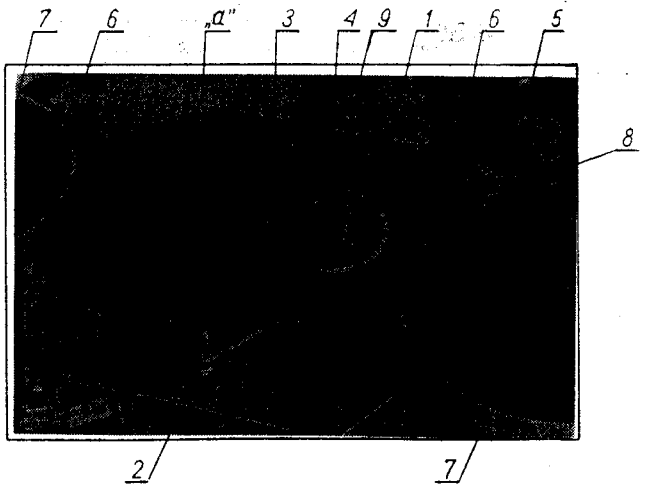


Fig. 5

2.3. Removal of Bridge

To remove the Bridge (5), if necessary:
— undo three screws (1)
— disengage the pushers from the pusthbuttons "START" (2) and "QUICK STOP" (3) and from the brake "QUICK STOP" (4),
— lift the bridge (5) so as to release the flywheel shaft (6) from the upper bearing (7),
— move the forward winding driven wheel (8) back in the direction of arrow so as to make it withdrawable from under the turntable (9),
— remove the bridge (5) from the supporting plate.
With the bridge removed, it is possible to replace the flywheel (12), the forward winding driving wheel and the mechanism lever — all these elements are accommodated under the bridge plate.

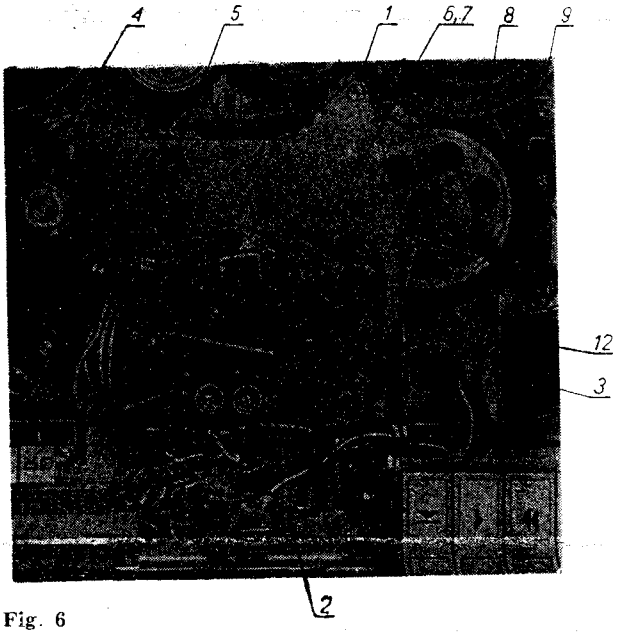


Fig. 6

2.4. Replacement of Speed Control Cam

To replace the speed control cam, remove the leap-wheel bar, undo the screw (2), take off lever (1) and remove the cam.

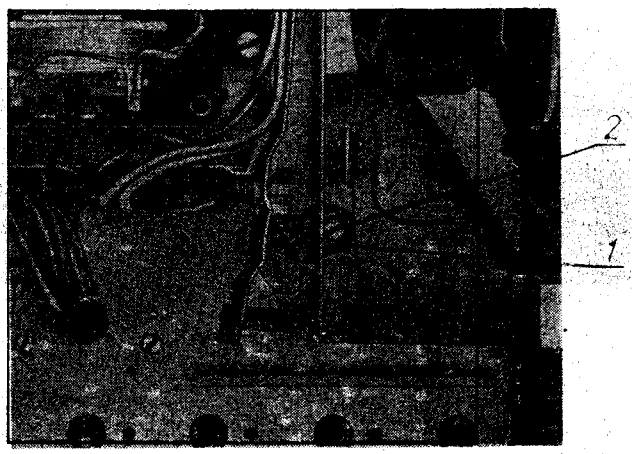


Fig. 7

2.5. Removal of Printed Circuit Boards

To remove the printed circuit boards (1), disconnect the wrapping connectors of sliding pushers (2) and bend the clamps (3) aside.
After reassembling the printed circuit boards, adjust the stroke of switches by bending the wrapping connectors (2).

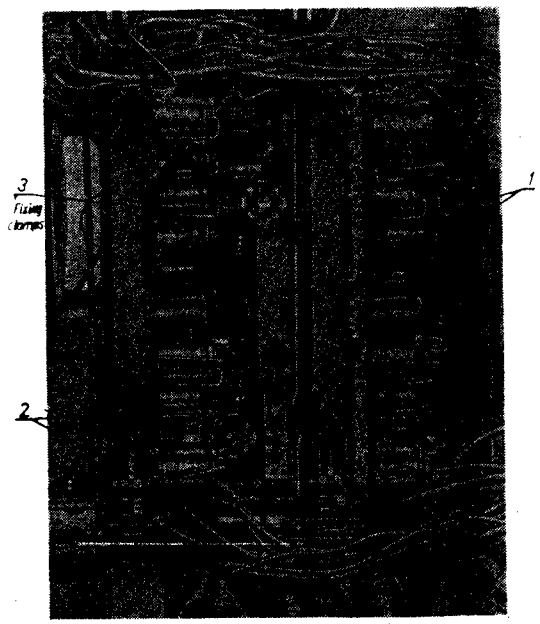


Fig. 8

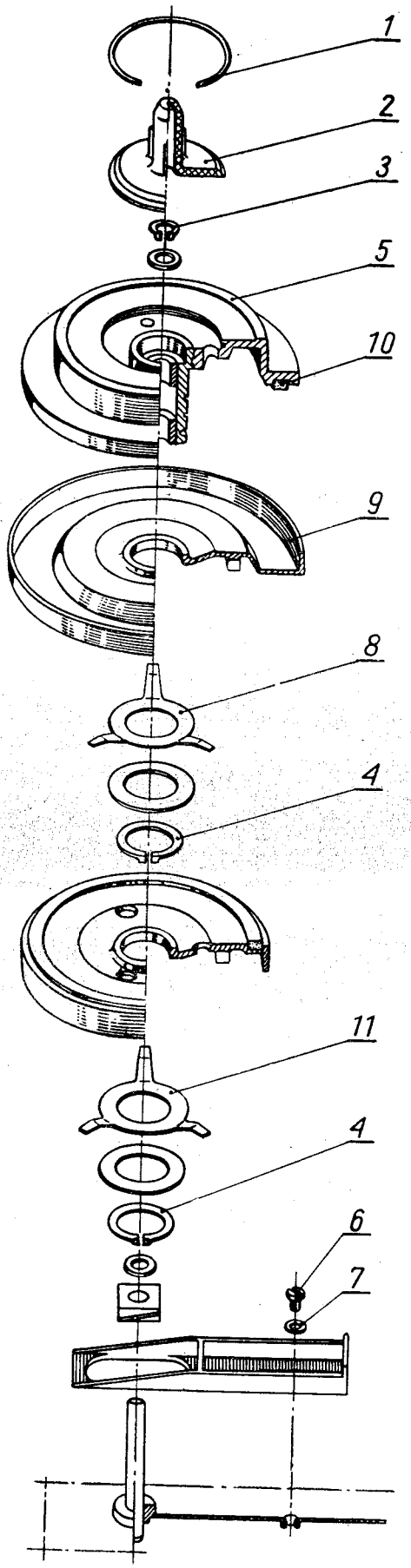


Fig. 9

2.6. Design and Replacement of Drive Mechanism

1. Spring
2. Driver
3. Cover clamping plates
4. Lock spring ring
5. Disk, compl.
6. Screw M3×6
7. Slider
8. Coupling Spring
9. Turntable
10. Felt strip
11. Coupling Spring

To dismantle the drive mechanism, use a screwdriver to remove the spring (1), the driver (2) and the cover clamping plates, and then, lift the drive mechanism. To dismantle the drive mechanism, use snap pliers for handling lock spring rings (4). Proceed the dismantling order as shown in Fig. 9.

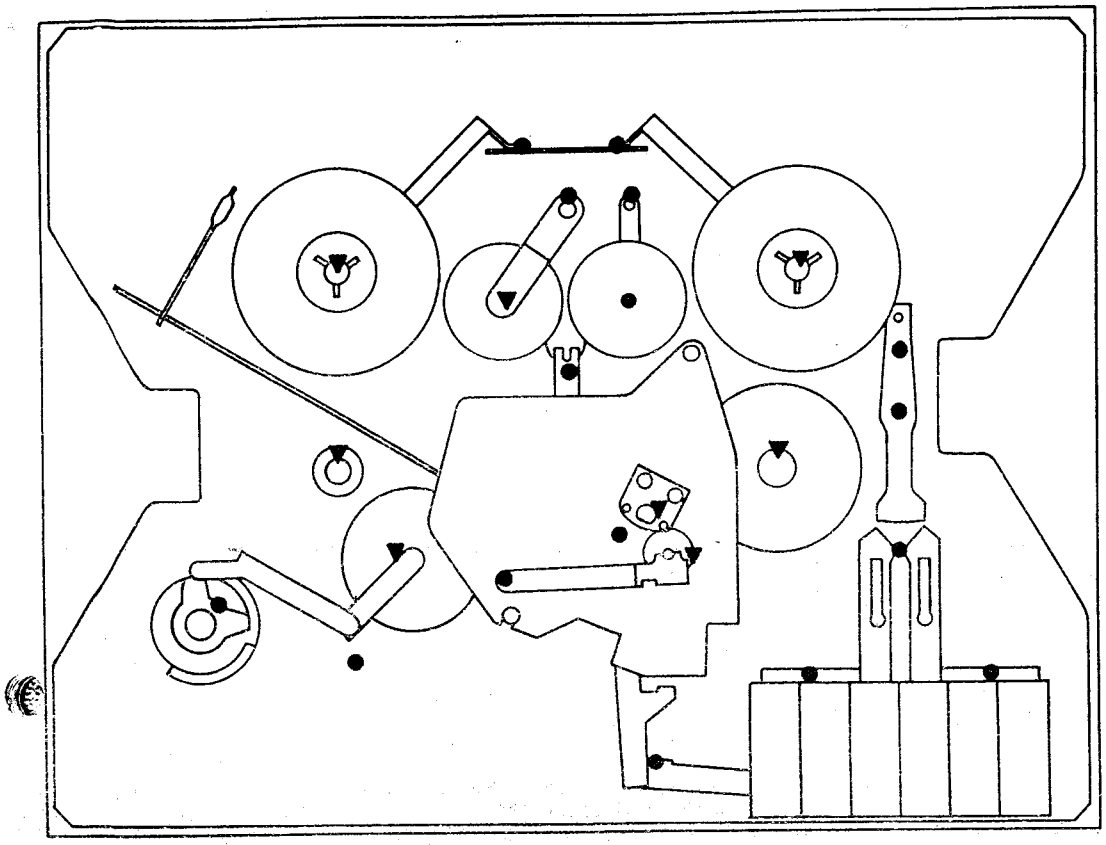


Fig. 10

3. LUBRICATION

At normal tape recorder operation, the amount of lubricant as factory-applied is sufficient for several years of service.

△ Lubrication procedure should strictly comply with the Lubrication Chart, Fig. 10. The DTE series MOBIL OIL (SAE 20 grade) is to be applied to porous bearings and associated washers, shafts and axles.

○ The GOJ-54 grease is to be applied to polyamide bearings and the remaining moving elements, sliding surfaces and friction points.

4. ADJUSTMENT

Mechanical design of the tape recorder has been devised so that with the proper replacement parts used for repairs and correct assembly, usually no adjustments are required.

Accordingly, all the adjustment interventions can be reduced to the indispensable minimum.

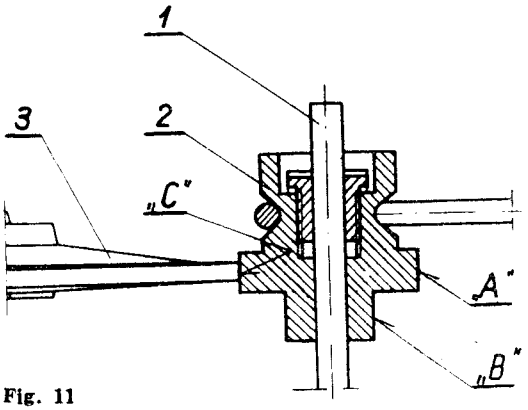


Fig. 11

4.1. Adjustment of Pulley on Motor Shaft

The position of the pulley (2) on the motor shaft (1) in relation to the leap-wheel (3) should be as follows:

— upper position — displacement of the runway centres "C" and "A" should not exceed ±0.2 mm

— lower position — displacement of the runway centres "C" and "B" should not exceed ±0.2 mm.

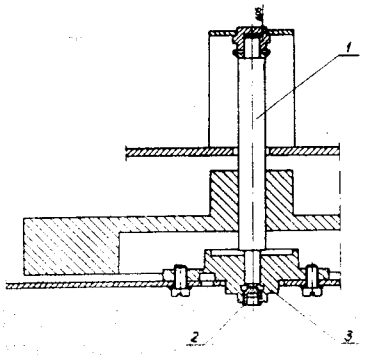


Fig. 12

4.2. Adjustment of Flywheel

The required 0.05 mm axial play of the flywheel is to be achieved by adequate adjustment of the screw (2) in the bearing mounting (3).

4.3. Height Adjustment of Turntables

The height of the turntables (5) should be adjusted so as to ensure a symmetrical disposition of the tape in relation to the spool centre.

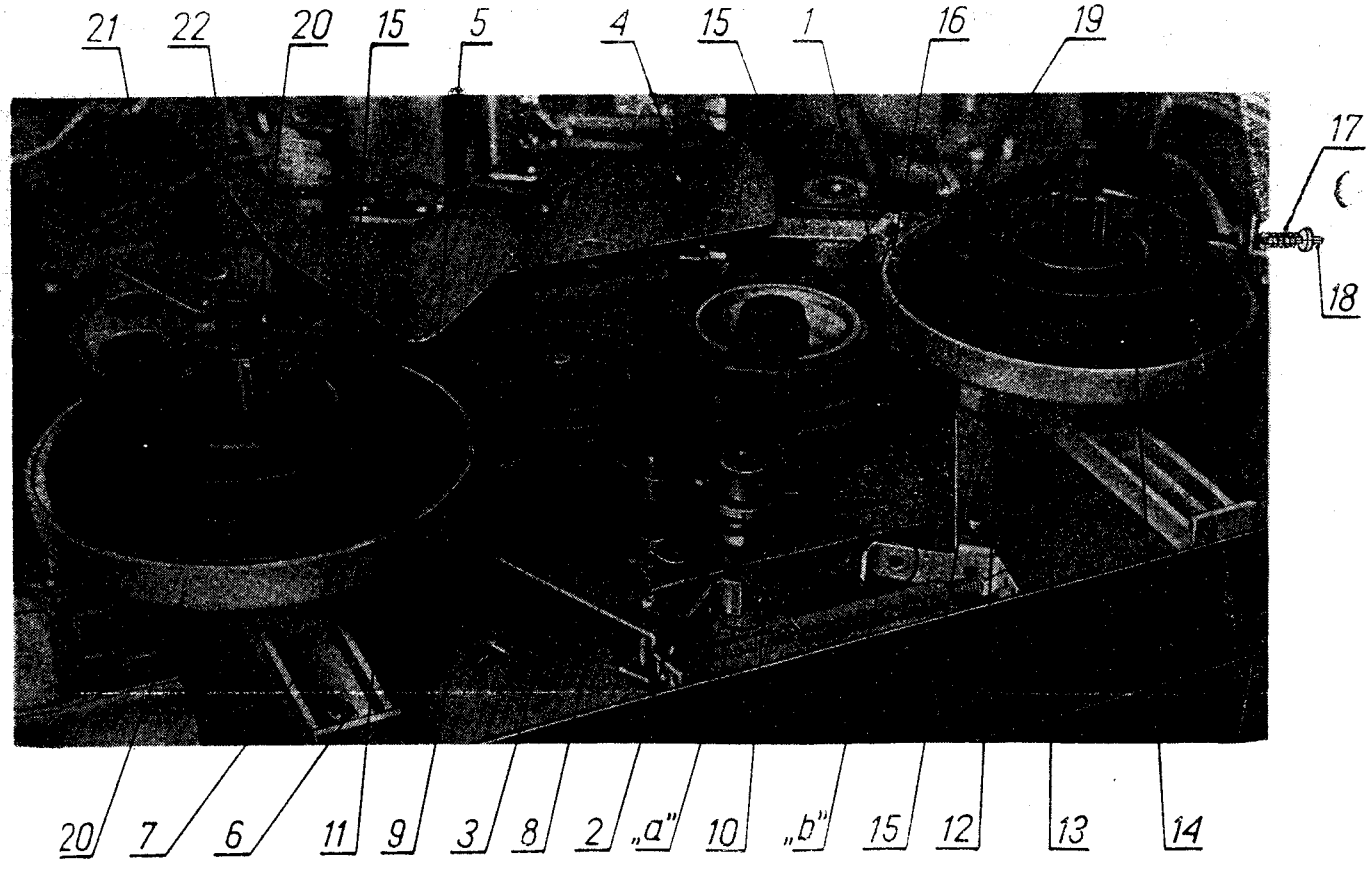


Fig. 13

The maximum allowance in the height should not exceed ±0.2 mm.
Prior to the height adjustment, remove the driver (20), release the spring clamp (22) and undo the screw (6). Then, adjust the slider (7) to achieve the required height.
Now, replace the driver and rewind a section of the tape in horizontal prosition. If the disposition of the tape on the spool is correct, replace the spring clamp on the shaft securing for the turntable an axial play of 0.2 mm approx. Finally replace the driver and retain it with the spring (21).

4.4. Mechanical Measurements

With the mains supply disconnected and the tape recorder in the "START" position, apply to the turntables pulling forces and measure the following forces as per Fig. 14
— left-hand spool, full 15 G
— left-hand spool, empty 45 G
— right-hand spool, full 20 G
— right-hand spool, empty 50 G
A 180 mm spool is to be used for these tests. To make adjustment, set appropriately the spring (2) — Fig. 15.

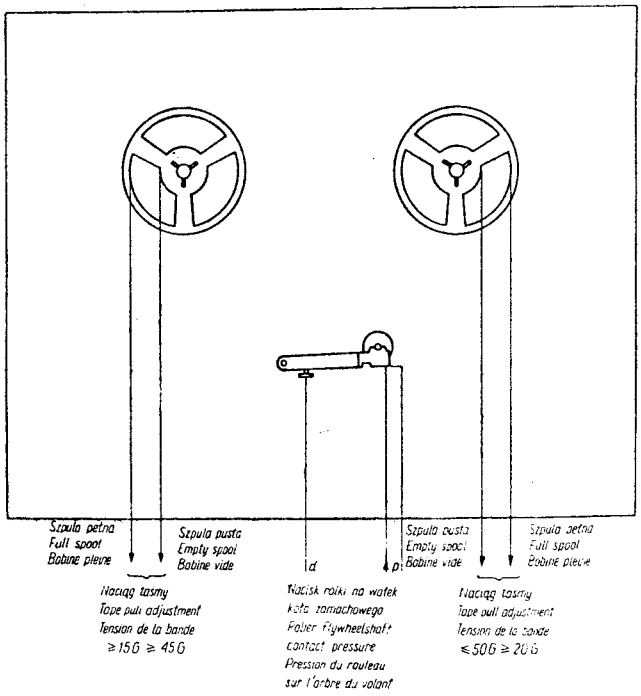


Fig. 14

4.5. Check of Overriding Clutch Moment

Check the moment of overriding clutch, with the turntable frictrion plate (3) braked:
— moment on the r.h. turntable — 1300 Gcm ± 10%
— moment on the l.h. turntable — 1300 Gcm ± 10%
To make adjustment, set appriopriately the spring (1), Fig. 15.

4.6. Check of Tape Run Uniformity

To make this check, follow the procedure as below:
— measure the tape pull as per para 4.4;
— wind some metres of the tape on to the r.h. spool, then rewind the tape over to the l. h. spool; at either test, check the tape disposition on the spool: the tape should be symmetrically disposed to the spool symmetry plane;
— in the position "START", observe the tape when it is passing through the adjustable guide pin (5); the tape should move freely between the pin flanges (the tape edges should not touch the flanges);
— observe the upper and lower edges of the tape; if any waving appears on the tape edge, adjust the tape run (take the observations on a brand new tape section).

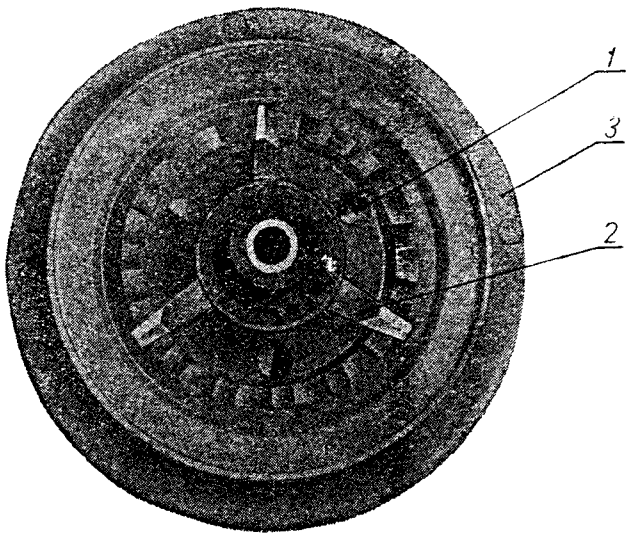


Fig. 15

4.7. Adjustment of Tape Run

If the tape pulls differ from the values as given under para 4.4., adjust the pulls according to the procedure as given there.
The adjustment procedure is as below (Fig. 16):

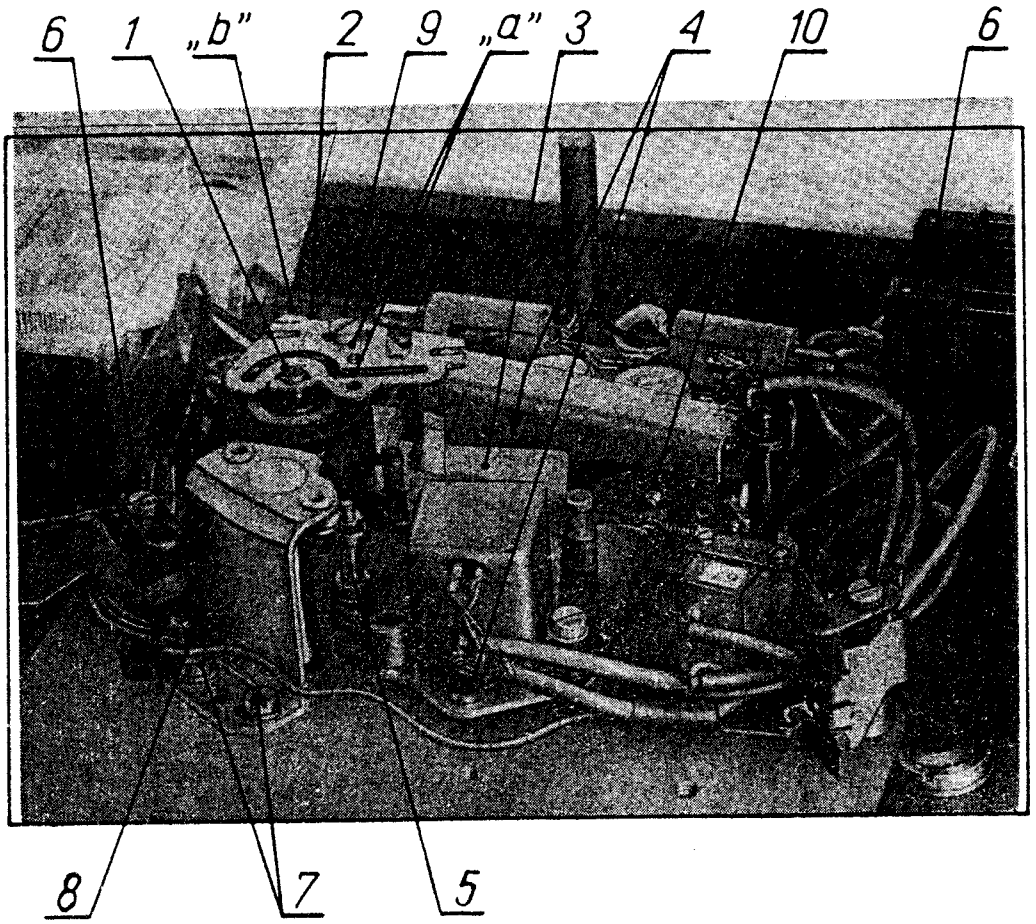


Fig. 16

— by adequate bending the locking plate (2) in point "a", adjust the rubber pinch roller (1) so as to achieve a uniform width of the gap between the pinch roller and the capstan in the "QUICK STOP" position,
— adjust the face of universal head to vertical position by means of screws (4),
— adjust the height of the adjustable middle guide pin (5) so that the tape section wound over the stationary extreme guide pins (6) comes freely between the guide flanges of the middle pin (i.e. the tape edges do not come in touch with these flanges).

This adjustment to be made with the mains supply disconnected and the tape recorder in the "START" position,
— loosen slightly the screws (7) retaining the bracket of the flywheel upper bearing (8). By means of the adjustment key 3-NX-694 shift the bracket so that in the "START" position the tape moves freely between the flanges of the middle guide pin (5) — (i. e. the tape edges do not come in touch with these flanges),
— with the tape running, loosen the screw (9) retaining the adjustable locking plate (2) of the pinch roller shaft (1). By means of the adjustment key 3-NX-694 shift the locking plate so that the pinch roller when raised into its upper position falls again down during at least three rotations and remains in its bottom position.

N o t e: As the two above mentioned adjustments are interrelated and may effect one another, it is recomended to repeat these procedures to make the tape run more precise.
— adjust the head heights and tilts according to para 6.2., bearing in mind that:
— the height is to be adjusted by means of the both screws (4) in the head base so as not to spoil the vertical setting of the head face,
— each height adjustment calls for the readjustment of head tilt.

The pinch roller/capstan contact pressure when measured at the point "b" should be equal to $650 \pm 10\%$ G.
To adjust it, use the screw (10).

N o t e: The above mentioned adjustments when properly carried out and with the use of typical standard elements will ensure tape speed and its uniformity to be as stated in the Specifications.

4.8. Adjustment of Winding System

When carrying out the adjustment of winding system follow the procedure as below:
— the position of slider (1) should axially agree with that of pushers (2).

Should no such agreement exist, readjust the position by bending the adjustment bosses in the chassis together with the spring at the point (a) — see Fig. 17.

To readjust the slider/pushers spacing, which is to be $0.5 \pm {}^{0.2}_{0.3}$ mm, use adjusting plates placed in the pusher/pushbutton joints,

— the clearance between the intermediate wheel (3), pulley (4) and turntable (5) should be distributed so that the clearance (Fig. 13) between the turnable (5) and the pulley (4) is equal to the summ of clearances existing between the turntable (5) and the intermediate wheel (3) and between the pulley (4) and the intermediate wheel (3).

To adjust, shift the pulley (4) as required after slackening the screw (6).

N o t e: There is no need to remove the belt (1) for this adjustment.

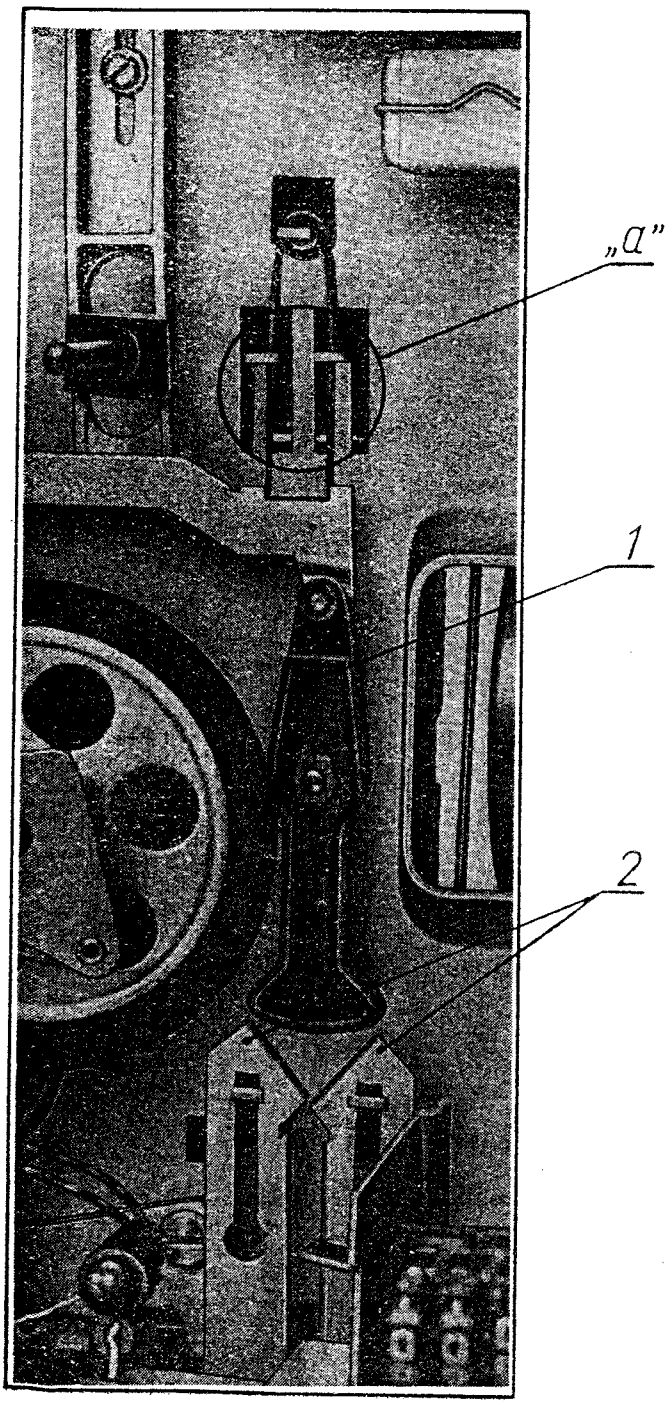


Fig. 17

4.9. Adjustments to Be Made with Pushbutton "START" or "FORWARD WINDING" Depressed

(see Fig. 13)

— set the lever of the r.h. auxiliary brake (8) relatively to the clutch bottom disk (11) on the turntable shaft (5) so that the brake is completely released. The minimum clearance between the broke lever lining (9) and the clutch bottom disk (11) on the turntable shaft (5) is to be at least 0.5 mm.

To adjust, bend the lever arm (8) and (10) at the point "a",

— set the lever of the l. h. auxiliary brake (12) relatively to the clutch bottom disk (13) on the turntable shaft (14) so that it is in the braking position. The minimum clearance between the brake lever arm (12) and the slider arm (10) at the point "b" is to be at least 0.3 mm.

To adjust, bend the lever arms.

4.10. Adjustments to Be Made with Pushbutton "REWINDING" Depressed

(see Fig. 13)

— The clutch bottom disk (11) of the r.h. turntable (5) is to be braked.

The minimum clearance between the auxiliary brake lever arm (8) and the slider arm (10) at the point "a" is to be at least 0.3 mm,

— the l.h. auxiliary brake (12) is in the released position.

The minimum clearance between the brake (12) lining (15) and the clutch disk (13) of the l. h. turntable (14) is to be at least 0.5 mm.

To adjust the auxiliary brake system, bend appropriately the lever arms (12) and the slider arms (10) at the point "b".

4.11. Adjustment of Main Brakes

(see Fig. 5)

The main brake lever (6) should be set relatively to the turntables (7) as follows:

— with the brakes released, the clearance between the turntables (7) and the friction pads (8) should be at least 1 mm,

— with the brakes in braking position the clearance between the lever arm ends (6) and the slider arms (9) should be at least 0.5 mm.

To adjust, bend the main brake lever ends (6).

4.12. Adjustment of "QUICK STOP" Brake

(see Fig. 13)

The pressure exerted by the "QUICK STOP" brake (17) on the turntable (14) should be equal to 450 G ± 10%.

To adjust, use the nut (18).

4.13. Correct Winding

(see Fig. 13)

The correct winding performance depends on the following parameters:

— belt pull (1)

— contact pressure exerted between the pulley and the turntable due to the action of the safety-pin type spring (19).

If the slip is on the motor pulley — replace the belt. If the slip is between the pulley (3, 4) and the turntable (20) — replace the safety-pin type spring (19) underneath the pulley (4) lever.

II. ELECTRICAL PART

5. GENERAL

The ZK-246 Model is a standard tape recorder (Cl. II acc. to PN/T-86150 Standard Specification) for domestic use. This is a two-speed four-track mono- and stereorecorder designed for four-track sound recording and playback acc. to International Standards.

The ZK-246 Model design allows for:
— sound recording from a microphone, a radio receiver, a record player or an other tape recorder, both in the mono and stereo system,
— synchronous recording (so called Playback System), with the simultaneous playback of the both tracks, if required,
— internal playback and recording from one track to another, with simultaneous external recording (so called Multiplayback System),
— playback of own recording, or of recording made by an other tape recorder (reproduction through own loudspeakers, external loudspeakers, amplifiers or earphones), both in the mono- and stereo system,
— fast tape rewinding.
The internal playback and recording from one track to another (Multiplayback) may be performed with the mode selector switch in the position "1/2", or "2/1".
In the position "1/2", the signal recorder on the track 1 or 4 may be transferred to the concurrent track 3 or 2 (fig. 18), and in the position "2/1" — the signal recorded on the track 3 or 2 may be transferred to the track 1 or 4.
During the multiplayback performance, it is possible to record an additional signal from a microphone, controlling this recording level by means of the potentiometer "5" (Fig. 1, L. H. channel).
The recording level of the recorded signal in the internal signal transfer from one track to another is not controlled, the system gain is determined by internal voltage dividers in the electrical channel.

Input sockets:
— microphone socket identified by symbol and used for recording from a microphnone with impedance ≤500 Ohms (e.g. MDO or Stereo GDSM 331).
— record player socket identified by symbol and used for recording from a mono or stereo record player.
— radio socket identified by symbol and used for recording from a mono or stereo radio receiver.

Output sockets:
— radio socket identified by symbol and used for driving an external amplifier (e.g. radio receiver) or another tape recorder to transfer records from one tape recorder to another,
— earphones socket identified by symbol and used for connection of mono or stereo earphones,
— additional loudspeaker socket identified by symbol and used for connection of a sound column or an external loudspeaker with resistance of (4÷8) Ohms.
The electrical system of the tape recorder consists of two component parts:
— the part provided on the upper side of the chassis and covering heads, potentiometers and the automatic tape end stopping system,
— the part provided on the small frame and covering the remaining electrical circuitry.
The both parts are electrically interconnected.
The ZK-246 Model is provided with an automatic cut-out system (i.e. an automatic return of the pushbutton switch to the position "STOP"). This system becomes operative when the metallized tape section shorts electrically the l.h. or r.h. tape pilot pin with an electrode (a shaped piece of sheet brass) which is connected through the MT6 relay winding to the power supply positive pole (+27 V).

When energized, the relay makes the circuit of electromagnet E1, and the latter draws back the pawl and, in consequence, releases the pushbuttons for free return. When the tape speed switch is set in the position "0" (disconnection of the mains supply), the pushbutton switch also automatically returns to the position "STOP". (The contacts St6 controlled by the tape speed switch lever connect the supply source negative pole to the MT6 relay winding, the relay becomes energized and effects the release action of the electromagnet E1 as described above).

6. REPLACEMENT AND ADJUSTMENT OF HEADS

During service, the tape recorder heads slowly wear up as a result of friction effect produced between the running tape and the head face. If this goes on for a longer time, the face of the head gradually deteriorates.

Symptoms of a worn universal head can be seen as a narrowed band within higher audio frequencies.

A worn head should be replaced by a new one.

6.1. Replacement of Universal Head

To replace a universal head, unsolder its electri-

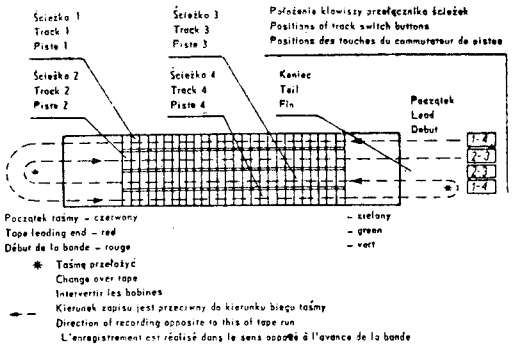


Fig. 18

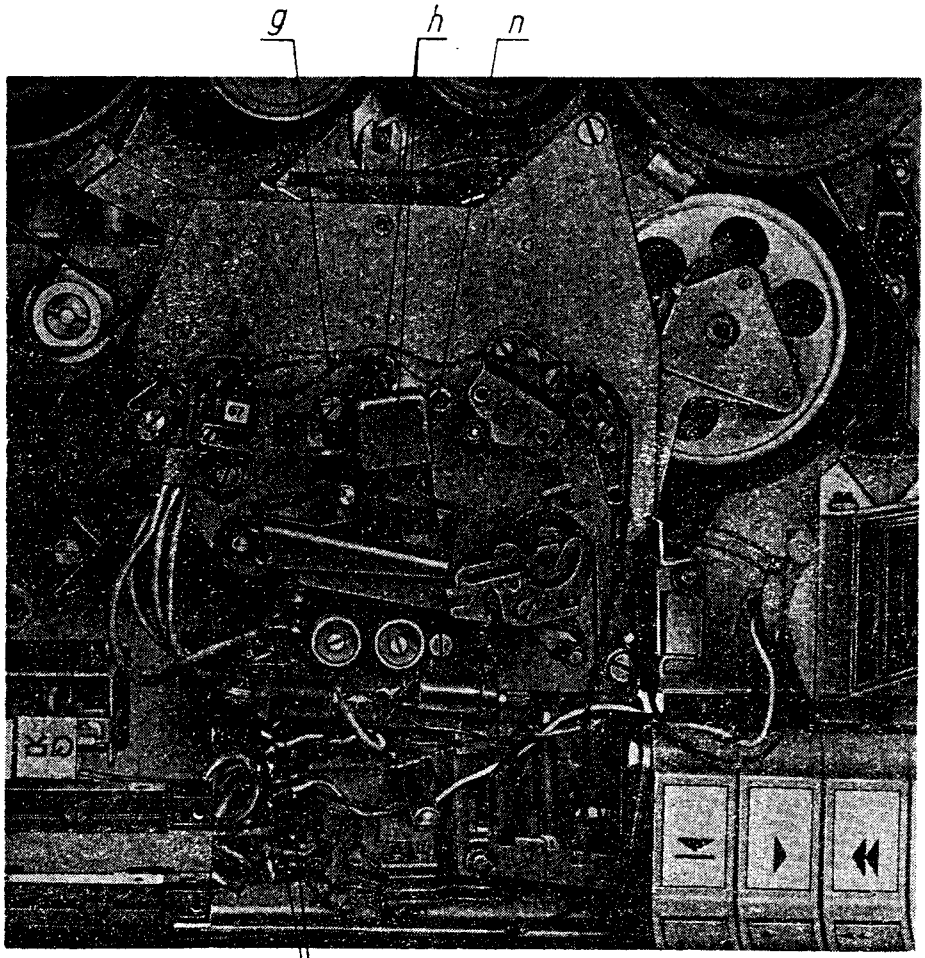


Fig. 19 The bridge with heads.

Method of fitting on erasing head

cal connections, remove the tape tension member along with the small spring, then undo the angular adjustment nut "n" and the screw "g" along with its washer and antagonistic spring. The plate with the screening flap being separated (the screw at screen bottom) from the screen, and the two lateral screws being loosened, it is possible to remove the head from the screen and to disassemble the thin permalloy sheet screen. When dismantling take care not to do any harm to the latter.

A reverse procedure applies when installing a new head. Set-up the head face in parallel to the capstan. No noticeable lateral tilt of the head is allowable while establishing this setting-up. Then, raise the head by turning clockwise the rear grub screw to such an extent that the lower edge of the tape runs over the guide pin bottom disk.

6.2. Adjustment of Universal Head

The head alignment procedure requires a millivoltmeter to be connected to the earphones socket (terminals 3 and 2). It is also recommended to connect an oscilloscope. To switch the head circuits, use the track selector switch and set it in the following positions:

1 — 4 upper circuit — track 1 or 4

2 — 3 lower circuit — track 2 or 3

R both circuits in parallel — track 1 and 3 or 2 and 4.

The head requires to be preset both in its height (the upper tape edge should be flush with the upper edge of the core) and in its vertical position (the head front should be parallel with the capstan).

To do this adjustment, use (play back) the test tape for setting four-track heads according to the TKT-ZK-009 Instructions.

Prior to the procedure, as described hereunder, the test tape must be wound forward and back on the tape recorder under test:

a) For the playback on section C (333 Hz), the voltage level difference of the 1—4 and 2—3 circuits cannot exceed 2 dB.

b) During the playback on section B (500 Hz) set-up the head height (screw "b" in Fig. 19). The voltage level difference should be the same as for the playback on section C, allowable tolerance being ± 0.5 dB.

c) During the playback on section A, set up the tilt of the head air gap in the vertical plane. To do this, use the nut "n" to produce maximum levels for both systems. Should these maximum levels present themselves at two different settings of the nut "n", set the nut "n" in a geometrically intermediate position between these two settings.

Then, check the voltage level difference of both systems; this should not be greater than 1 dB after taking into account the difference as measured for the playback on section C.

For instance, if for the playback on section A the 1—4 circuit level is higher by 2 dB than the 1—3 circuit level, and if for the playback on section C the system 1—4 circuit level is higher by 1 dB, so the level difference 2—1=1 dB is permissible. If, however, the 1—4 circuit

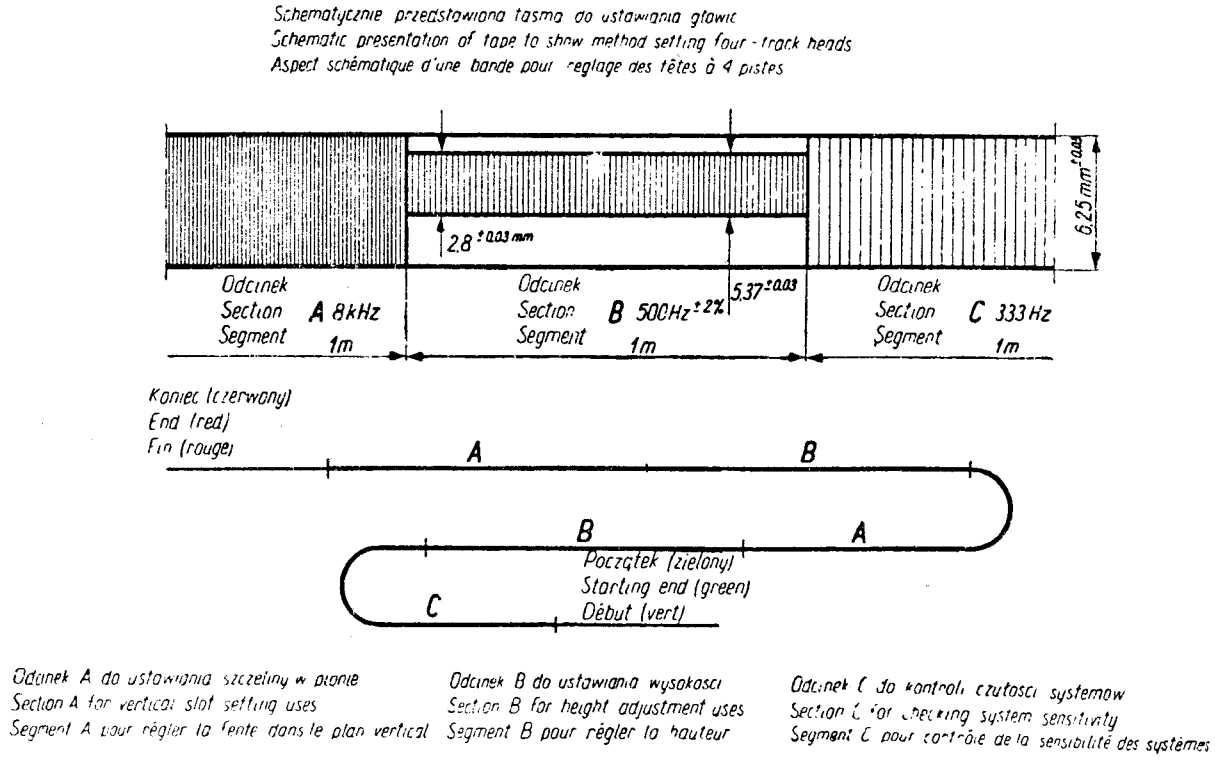

Schematycznie przedstawiona tasma do ustawiania glowic
Schematic presentation of tape to show method setting four-track heads
Aspect schématique d'une bande pour reglage des têtes à 4 pistes
2.8 ±0.03 mm
6.25 mm ±0.05
Odcinek Section Segment A 8kHz 1m
Odcinek Section Segment B 500Hz ±2% 1m
5.37 ±0.03
Odcinek Section Segment C 333Hz 1m
Koniec (czerwony)
End (red)
Fin (rouge)
A
B
B
A
Początek (zielony)
Starting end (green)
Début (vert)
C
Odcinek A do ustawiania szczeliny w pionie
Section A for vertical slot setting uses
Segment A pour régler la fente dans le plan vertical
Odcinek B do ustawiania wysokości
Section B for height adjustment uses
Segment B pour régler la hauteur
Odcinek C do kontroli czułości systemów
Section C for checking system sensitivity
Segment C pour contrôle de la sensibilité des systèmes

Fig. 20 Test tape for setting four-track heads

level is lower by 2 dB than the 2—3 circuit level (on section A), then the level difference is 2+1=3 dB and is inadmissible. As the adjustments specified under items b and c are interrelated and may affect each other, repeat these two procedures using successive tape sections B and A. If the level difference for the playback on section A exceeds permissible values, check the tape-to-head face adherence for correctness. Unsatisfactory results may also be the effect of a worn out test tape.

6.3. Assembly of Erasing Head

The erasing head is retained in its position by means of two screws, and no adjustment is necessary after its replacement.

7. ADJUSTMENT OF BIAS SIGNAL AND ERASE CURRENT GENERATOR

The bias signal generator is installed on the printed circuit board 2403-5476-120-01K.
For high frequency voltage measurements use a 1:1000 capacitance-type voltage divider.
This will allow to express the measured volts in millivolts. The divider input capacitance should be ≤5pF.

7.1. Adjustment of Generator Frequency

The frequency of generator oscillations, both in the mono and stereo arrangement, should be 65 kHz ±2 kHz. The frequency difference of generator oscillations in the mono arrangement and the stereo arrangement should not exceed 0.4 kHz.
To tune the generator, do it first in the stereo arrangement and adjust the L_3 coil core so as to tune the frequency to 65 kHz.
Then with L_4 coil core in its midway position, check the generator frequency for each head circuit (f_{1-4} and f_{2-3}) in the mono arrangement and note the results. Set the L_4 coil core in the mono arrangement so that the generator frequency in the stereo arrangement is placed between the frequencies in the mono arrangement (Fig. 21) and the $\triangle f_1$ and $\triangle f_2$ difference is less than 0.4 kHz.

7.2. Erasing Voltage

The high frequency voltage as measured on the erasing head should be ≥37 V, and the voltage difference between the 1—4 and 2—3 circuit should be ≤2 V.

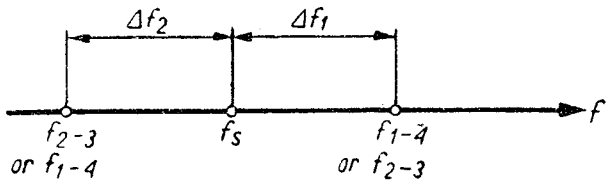


Fig. 21

7.3. Adjustment of Bias Signal Voltage

The bias voltage should be 13 V ± 4 V. The proper bias voltage value (Up) should be set while verifying the recording/playback response according to para 11 To adjust the bias voltage, do this in the mono arrangement by means of trimmer C_{49} for the 1—2 circuit and by means of trimmer C_{50} for the 3—4 circuit (adjust each circuit separately).
The bias voltage difference in the mono and stereo arrangement should not be greater than 0.2 V for each circuit.

8. VOLTAGE AMPLIFIER CHECKING AND ADJUSTMENT

The voltage amplifier is installed on the printed circuit board 4-403-5476-059-027, 4-403-5476--059-035.

8.1. Recording Circuit

8.1.1. Measurement Set-Up
Connect an audio generation to the "MICROPHONE" (⏚) socket, terminals 2 and 3 or 5 and 2, through a divider as shown in Fig. 22; the input voltage to be tested on the audio generator terminals.
The divider attenuation considered, the voltage applied to the socket is 10^{-4} Eg (for instance, Eg=1 V, U_{inp}=0.1 mV).
The output voltage to be measured on the "EARPHONES" (⏚) socket, terminals 2 and 3 or 5 and 2, as shown in Fig. 23.
The recording level control (P1) to be set in its maximum position.
Depress the pushbutton ⏚ in the input selector switch.
Depress the "RECORDING" pushbutton.
8.1.2. Gain
The gain measurement to be carried out for the frequency of 1000 Hz.
For the input voltage value of 100 μV, the gain is expected to be:
for the speed of 9.5 cm/s 80 dB±1 dB (1 V)
for the speed of 19 cm/s 80 dB±1 dB (1 V)
While taking measurements, make a check of the recording level indicator which in the case of 100 μV input voltage should be at the beginning of the red area. If necessary, use the R75 adjustable potentiometer to make a correction.
8.1.3. Frequency Response
This measurement to be carried out in the set-up as shown in Fig. 22, for a constant value of the input voltage=10 μV and for all test frequencies. The frequency response at both speeds should conform with the curves, as plotted in Fig. 24, with in tolerance ±1 dB.
Test points:

Speed cm/sec	Frequency							
	Hz			kHz				
	40	80	333	1	6.3	10	16	18
9.5	+3.5	+1.5	0	0	+3.5	+7	+13	—
19	+3.5	+1.5	0	0	+1	+2	+3	+3

Should this measurement be impossible due to a too high noise level (signal-to-noise ratio ≤10 dB), increase the input signal and then use the recording potentiometer to step-down the gain so as to maintain the required signal-to--noise ratio.
The input voltage should not exceed 2 mV and the output voltage 2 V (at anty point of the response).

8 1 4 Noise Voltage

The noise voltage as measured on the earphones socket (see Fig. 23), with the recording potentiometer P1 set in its maximum position, should not exceed 25 mV, for both tape speeds.

Test procedure:

— the "MICROPHONE" input: contacts 3 and 2 or 5 and 2 bridged through a 200 Ohms resistor,

— the input selector switch: the pushbutton depressed,

— the "RECORDING" pushbutton — depressed.

With the both RECORDING and START pushbuttons depressed at the same instant and with the bias voltage set to the appropriate level, the 65 kHz noise ratio cannot exceed 0.15 V as measured on the earphones output for any potentiometer setting.

To adjust, tune the L2 and L4 coils so as to obtain the minimum deflection on the voltmeter

8.2. Playback Circuit

8.2.1 Measurement Set-Up

The voltage from the audio generator is fed through the 10 kOhms/10 Ohms divider (refer to Fig. 25), with a 10 Ohms resistor being connected in place of the universal head. (With the cover removed from the head carrying bridge, head leads are readily accessible).

The input voltage is to be measured on the audio generator terminals. The divider attenuation considered, the input voltage $U_{inp} = 10^{-3} Eg$. (For instance, $Eg = 1$ V $U_{inp} = 1$ mV).

The output voltage is to be measured on the "EARPHONES" socket, terminals 2 and 3 or 5 and 2.

The "START" pushbutton — depressed.

8.2.2. Gain

The gain measurement to be carried out for the frequency of 1000 Hz.

For the input voltage value of 1 mV, the gain is expected to be:

— for the speed of 9.5 cm/sec 63 dB ± 1 dB (1.4V)

— for the speed of 19 cm/sec 62.5 dB ± 1 dB (1.35V).

8.2.3. Frequency Response

This measurement to be carried out for a constant value of the input voltage = 50 μV and for all test frequencies.

The frequency responses at both speeds should conform with the curves as plotted in Fig. 26, with tolerance within ± 1 dB.

Test points:

Speed cm/sec	Frequency							
	Hz			kHz				
	40	80	333	1	6.3	10	16	18
9.5	+20	+17.5	+7.5	0	−2.5	−1	+6	−
19	+20	+17 5	+7.5	0	−4	−4	−2.5	−1

Within the high frequency range, the frequency responses may be changed by means of:

— the R31 adjustable potentiometer for 18 kHz (speed 19)

— the R34 adjustable potentiometer for 16 kHz (speed 9.5)

8.2.4. Noise Voltage

With the audio generator and the attenuator being disconnected and with the head being normally connected the noise voltage as measured on the "EARPHONES" socket (terminals 2 and 3 or 5 and 2) should not exceed 10 mV for both speeds.

9. POWER STAGE

The power stage is installed on the printed circuit board 2403-5476-056-01K.

9.1. Measurement Set-Up

The power stage measurement to be carried out on the 5 Ohms ± 2% resistor connected to the additional loudspeaker socket (Fig. 27).

Internal loudspeaker to be disconnected during this measurement.

The audio generator to be connected in the same manner as for the playback circuit measurement (Fig. 25).

The volume level control to be set up in its maximum position (extreme clockwise position) the tone control to be set to the wide frequency band (extreme clockwise position).

The pushbutton switch: the "START" button depressed.

9.2. Gain and Distortions

For the 333 Hz frequency, the non-linear distortions should not exceed:

— for the output voltage value of 3.9 V (3 W) — 2%.

— for the output voltage value of 5 V (5 W) — 5%.

The test voltage as measured on the "EARPHONES" socket, terminals 3 and 2, is expected to be 1.2 V ± 2 dB for the 5 W power output level. If the distortions exceed the values as stated above, set the no-load current to 15÷20 mA by means of the R55 potentiometer, and the D.C. voltage between the T9 and T10 transistor heat sinks to approx. 14 V by means of the R59 potentiometer.

The amplifier being set to its maximum gain should produce a symmetrical peak slipping of the sine waveform as observed on the oscilloscope.

9.3. Frequency Response

For all test frequencies, the test voltage as measured on the "EARPHONES" socket (terminals 3 and 2) should be 0.8 V.

The frequency response on the loudspeaker output (on a 5 Ohms resistor) should comply with the data in the table below, with tolerance within ± 1 dB.

40 Hz	333 Hz	1 kHz	16 kHz
−2 dB	−0.5 dB	0 dB	+0.5 dB

With the tone control set to the narrow frequency band (extreme anticlockwise position), the 16 kHz frequency response is expected to show a fall slope ⩾16 dB.

10. CHECK AND ADJUSTMENT OF AUTOMATIC TAPE END STOPPING SYSTEM

The tape recorder pushbuttons should be automatically released to their rest position when:
— the metallized tape section connects the pin to the auxiliary electrode, or,
— the tape recorder is disconnected from the mains (switched off).
If this automatic releasing system seems to operate in a faulty way, first check the pin and the St6 spring for a reliable contact, then check also the electromagnet and, if necessary, readjust it.
The automatic cut-out system is ready for operation after abt. 10 seconds from switching-on the recorder to the mains or from the previous operation.

11. TAPE MEASUREMENTS

Requirement data as specified below relate to the DP26LH tape with C264Z coating.

11.1. Measurement Set-Up

When recording from an audio generator, the voltage to be fed to the "MICROPHONE" socket (terminals 3 and 2) in the set-up as shown in Fig. 22.
The measurement set-up as shown in Fig. 23 to be used for playback purposes.
The input capacitance of the instrument (inclusive of cable) should be $\leq$180 pF.
To carry out the recording, depress the pushbuttons "RECORDING", „START" and „QUICK STOP", then apply the 0.25 mV from the generator to the recorder and set the recording gain control so as to align the meter pointer at the beginning of the red area.

11.2. Gain

A 333 Hz signal recorded at the maximum recording level (recording level pointer set at the beginining of the red area) should produce a playback signal voltage $\geq$2.4 V for both tape speeds, and the playback voltage difference for the r.h. and l.h. channel should not exceed 5 dB. A 333 Hz signal recorded at the maximum recording level in the Multiplayback System (the mode selector switch in the position "1/2" or "2/1") should produce a playback signal voltage $\geq$1.6 V.

11.3. Check of Erasure Effectiveness at 40 Hz Frequency

A 40 Hz signal recorded at the maximum recording level and then erased at the minimum recording level should produce a playback signal voltage value not greater than 10 mV. (when erasing, disconnect the audio generator from the amplifier input).

11.4. Frequency Response

The recording — playback frequency response in the mono and stereo system should be within tolerances as specified in Fig. 28. The recording should be carried out at a level lower than the maximum recording level by 25 dB. The recording — playback frequency response tested in the Multiplayback System (the mode selector switch in the "1/2" or "2/1" position) should be within tolerances as specified in Fig. 29. The recording should be carried out at a level lower than the maximum recording level by 25 dB.

11.5. Harmonic Distortion

With a 333 Hz signal recorded at the maximum recording level, the 3-rd harmonic distortion (h_3) should not exceed 5%.

11.6. Tape Speed and Tape Speed Non-Uniformity

The tape speed and tape speed non-uniformity to be tested in compliance with the requirements of PN-69/T-86150 Standard Specification.
The tape speed non-uniformity should not exceed:
— for the speed of 9.5 cm/sec — 0.2%
— for the speed of 19 cm/sec — 0.15%
and the mean speed deviation from the rated values should not be greater than $\pm$2%.
Note: Should the values as specified above be exceeded, check and readjust the mechanical system according to instructions stated in the Mechanical Part of this Manual.

12. TRANSISTOR REPLACEMENT

The tape recorder to be disconnected from the mains. When replacing the transistors, do not overheat the transistors.
The transistors BCP107 series, group A, B and BCP108 series, group A, B and C of Polish make are equivalent to the international transistor series type BC107, group A, B and BC108, group A, B and C. It is allowed to use transistors of Polish make: BC527 series, group I and II, and BC528 series, group I, II and III.
At the end of this Manual you will find a tabulated list of transistors used in the ZK-246 tape recorder, their manufacturers and equivalent replacement.
To achieve parameters as stated in the Specification, it is necessary always to use appropriate transistors:

T1 — BC109, group B or C.
There should be used "non-sparking" transistor BC109 group B or C, or their equivalents of ITT, TFK, Siemens and other make. It is allowed to use transistors BCP 108 series, group B or C, BC528 series group II or III, segregated for noise voltage $\leq$2.5 μV acc. to Instructions TKT/ZK-042.

T2 — BCP108, group C — this transistor also to be segregated for noise voltage as T1.
It is allowed to use transistors BC108, group C, or BC 528, group III.

T3, T4, T5, T6, T7, T14, T15, T16, T17, T18 — Transistors BCP107 series and BCP108 series may be substituted by BC527 and BC528 series, or by equivalent types of foreign make.

T7, T8 — BC177, group B — along with T1 from a complementary pair. If one of these transistors is to be replaced, the other should be chosen to the new one so as to meet the conditions as below:

$\frac{h_{21E}^{(1)}}{h_{21E}^{(2)}}$ = 1.3, for U_{CE}=1 V, I_C=20 mA and for U_{CE}=5 V, I_C=1 mA

T9, T10 — 2×TG70 (complementary pair)
Required condition; $h_{21E} \geq 30$
Note: After replacement of transistors T7, T8, T9, T10 — check the power stage as per para 9.2.

T13 — TG70; $h_{21E} \geq 30$.

LIST OF TRANSISTORS USED IN THE ZK-246 TAPE RECORDER, THEIR MANUFACTURERS AND EQUIPMENT

TEWA—Poland	Sescosem	Siemens	Telefunken	ATES	Mistral	Philips	ITT
BCP107 BC527	BC107 BC207	BC107, BC167 BC147	BC107 BC129	BC107 BC267	BC107 BC207	BC107, BC237 BC147	BC107 BC171
BCP108 BC528	BC108 BC208	BC108, BC168 BC148	BC108, BC168 BC130, BC238 BC148, BC198	BC108 BC268	BC108 BC208	BC108, BC239 BC149	BC108 BC172
	BC109	BC109	BC109	BC109	BC109	BC109	BC109, BC173
	BC177, BC204	BC177, BC307 BC157	BC177	BC177	BC177, BC204	BC177, BC157	BC266, BC256
TG70		AD149, AD150	AD149, AD150	AD143			
BZ11C3V3						BZY88C3V3	ZF3,3 ZW3,3
BZ11C10	BZX5SC10					BZX79C10 BZY88C10	ZF10, ZW10
BZ11D1 BZP6870V75	BZX62		BZ102/0V7		BZX62		ZG1
BA561	BY137/400 1N537				BY151N	BYX36-150	BYY31 1N4002
DOG55	SFD112 (AA131) 1N541 (AA119)	AA113, AA119 AA117, AA118	AA113, AA119 AA117, AA118 AA111	AA121 AA131	1N541 (AA119) SFD112 (AA131)	AA119	AA143 AA144

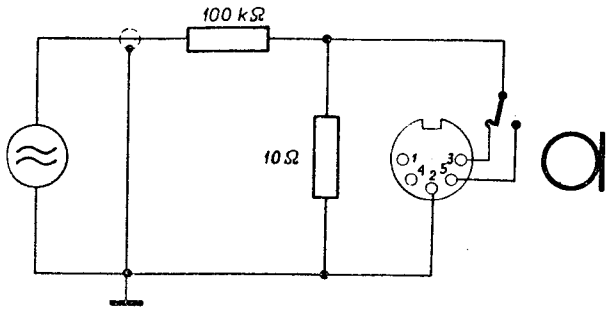


Fig. 22

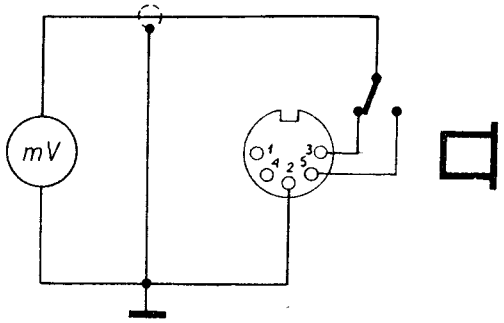


Fig. 23

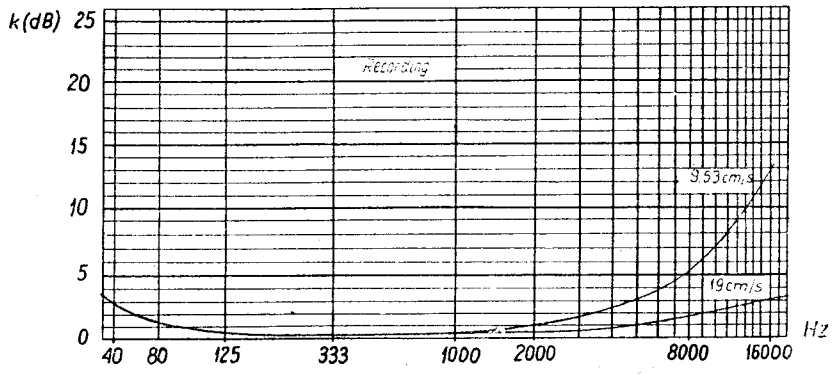


Fig. 24

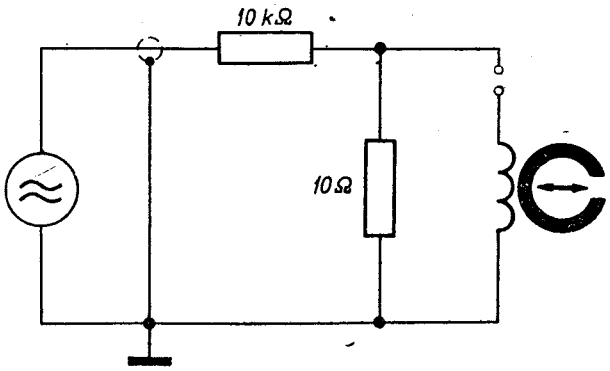


Fig. 25

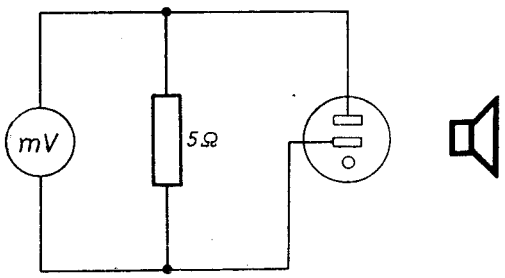


Fig. 27

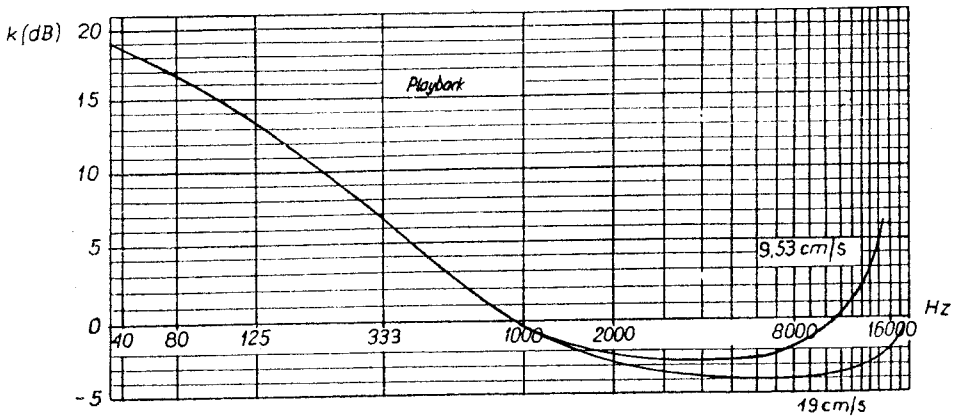


Fig. 26

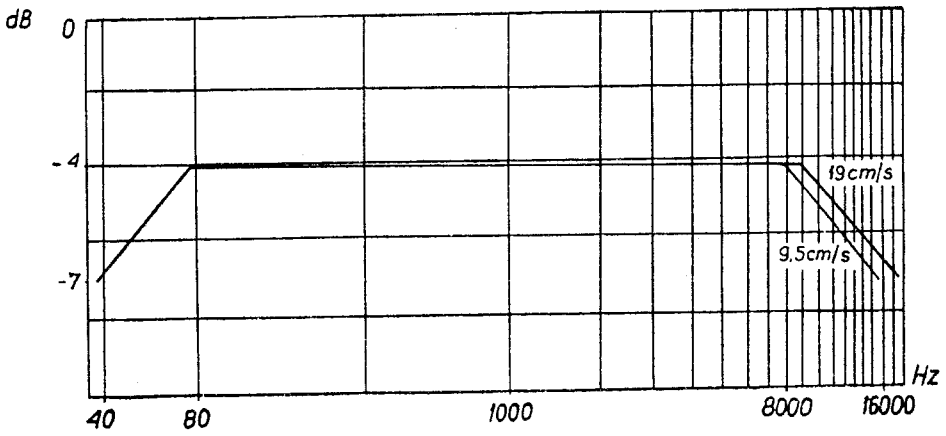


Fig. 28

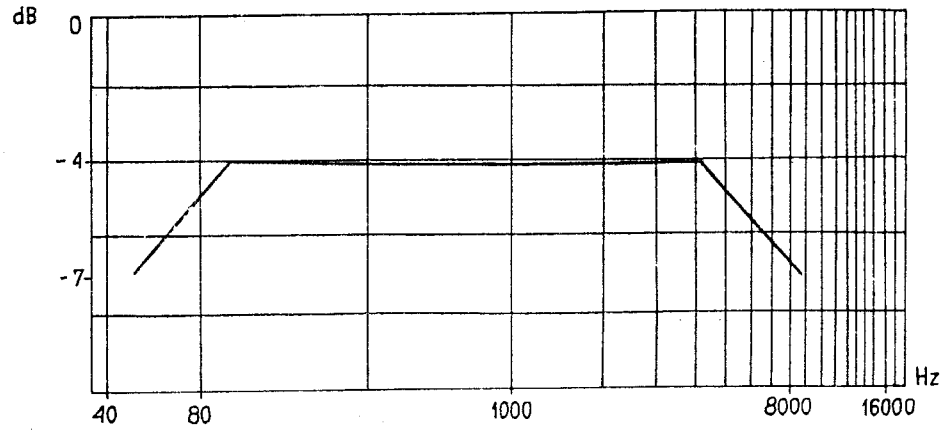


Fig. 29

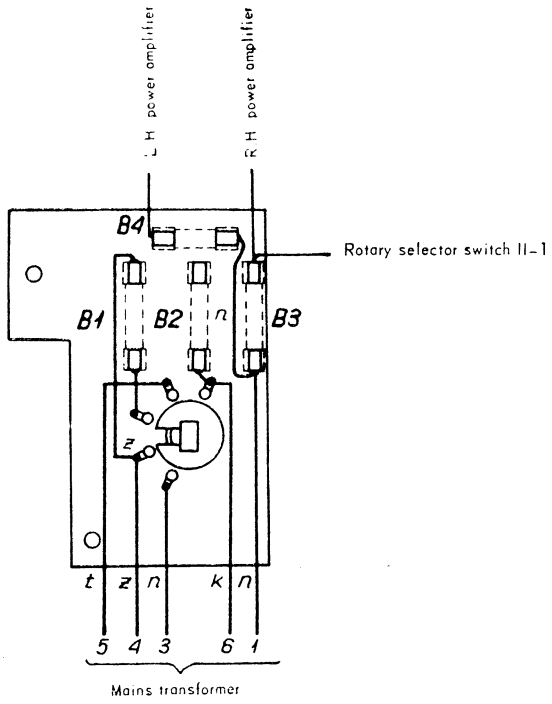


Fig. 30 [1]

4-402-5476-125-011

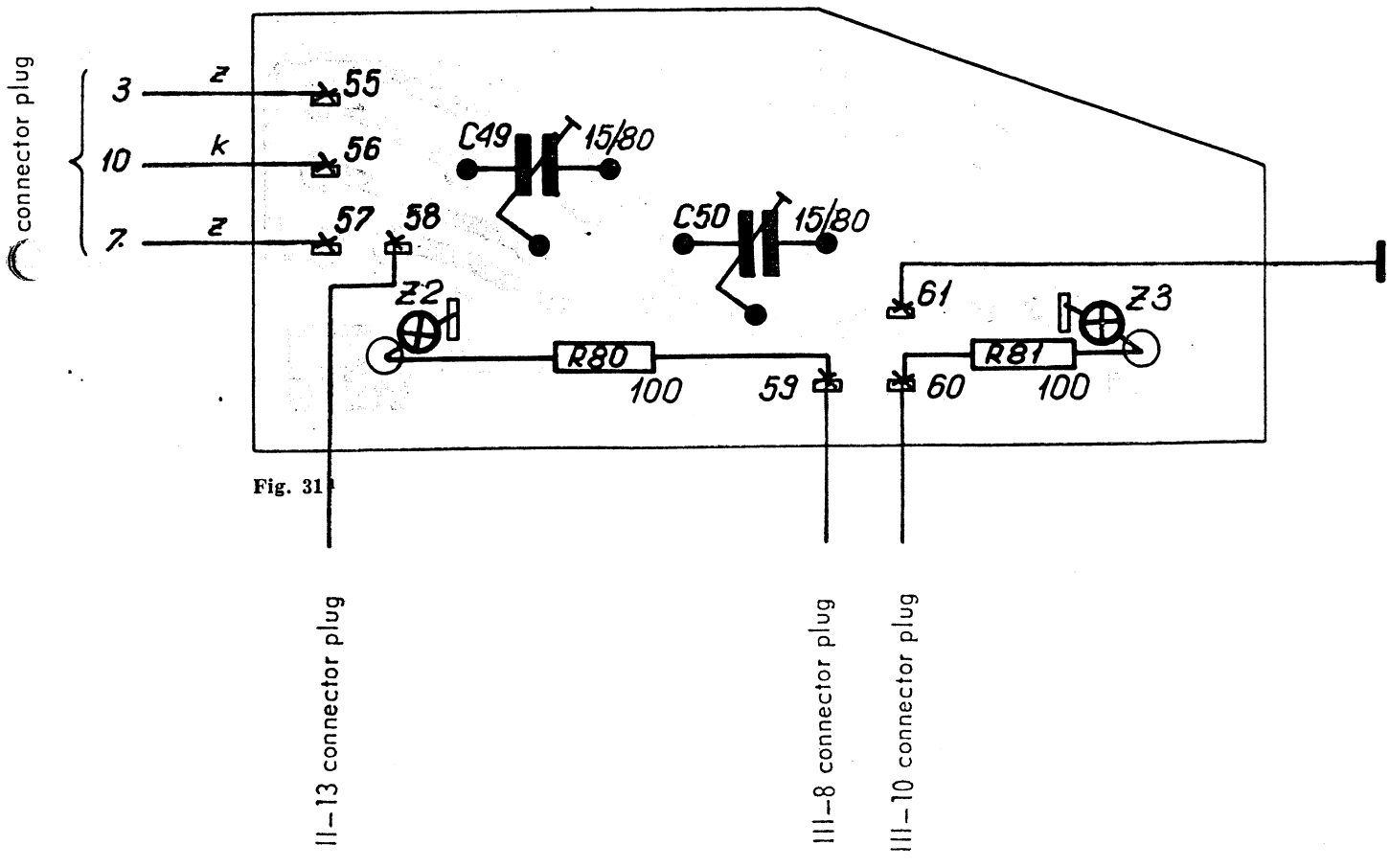


Fig. 31 [1]

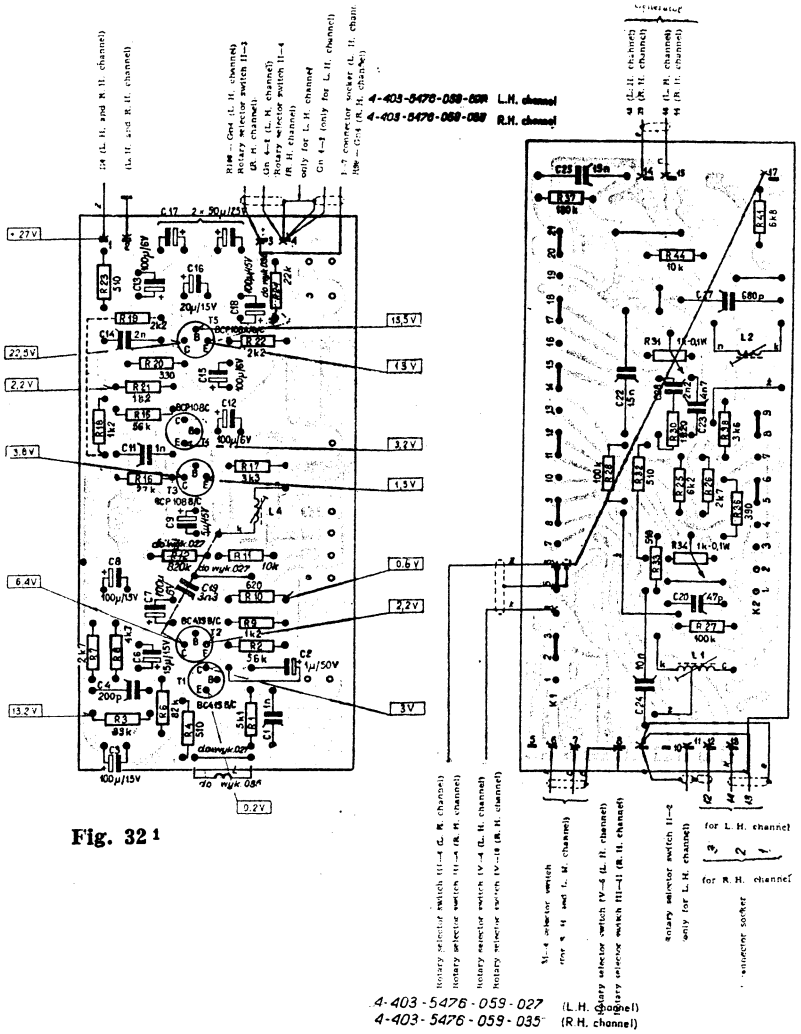


Fig. 32 1

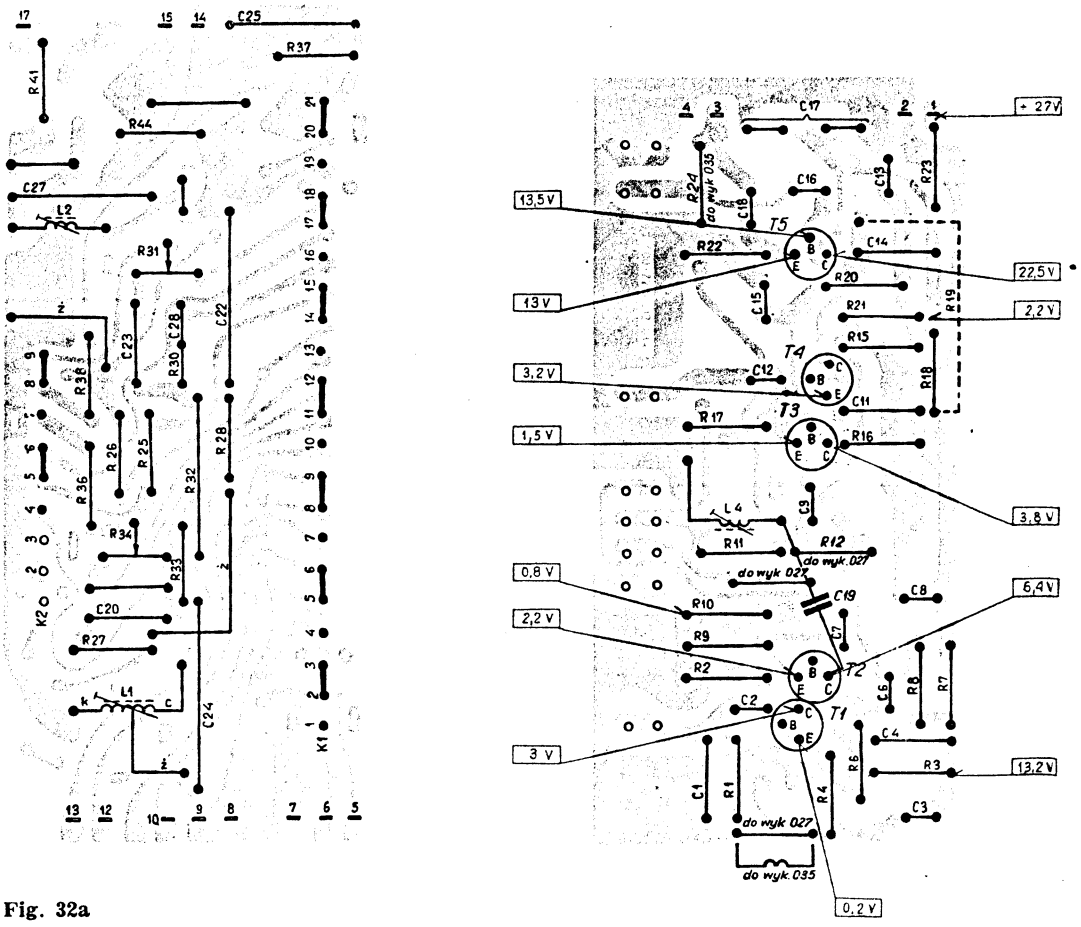


Fig. 32a

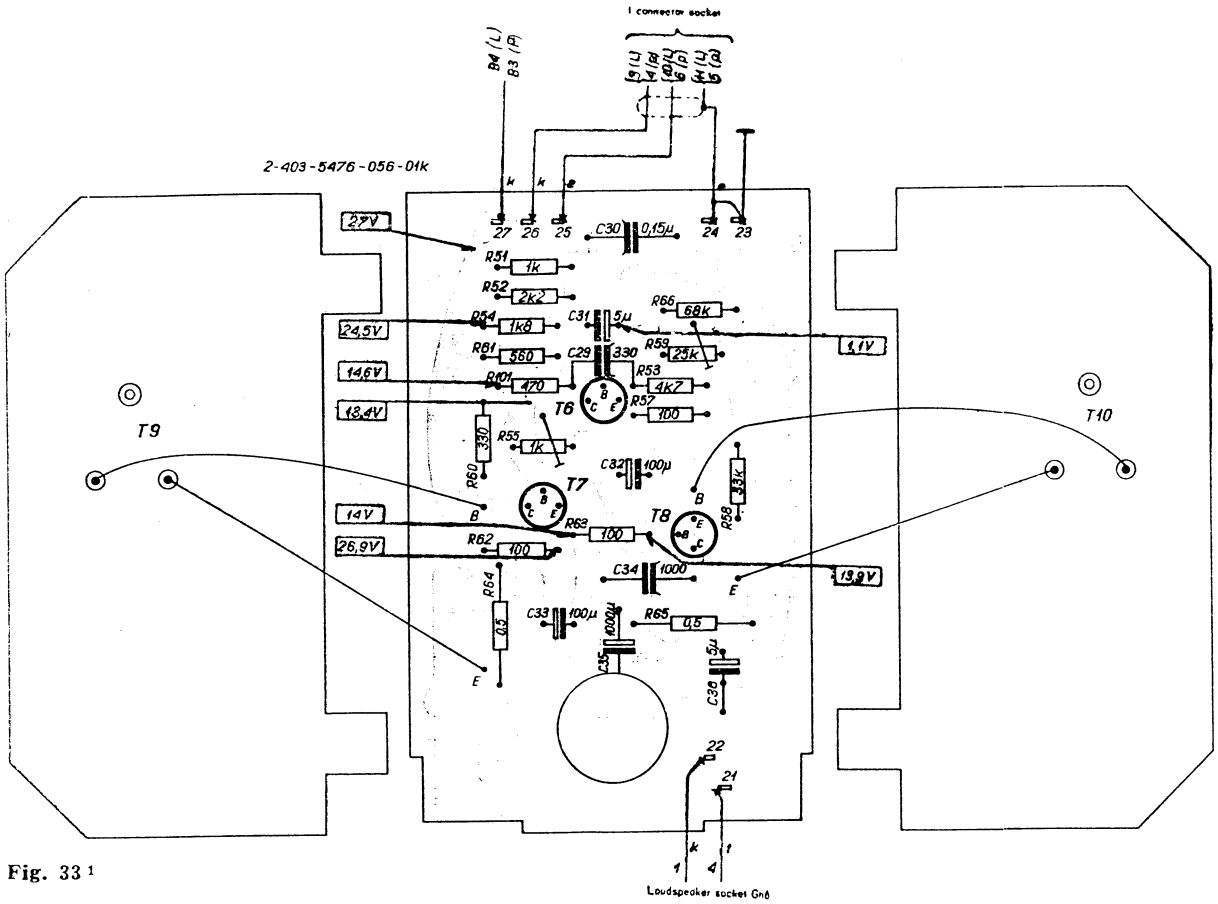


Fig. 33 [1]

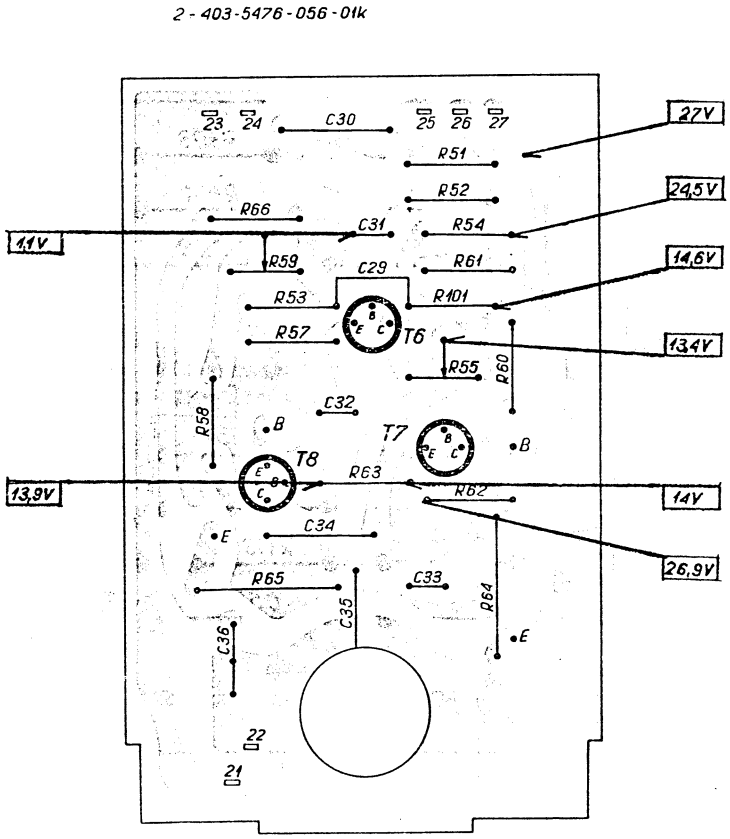


Fig. 33a

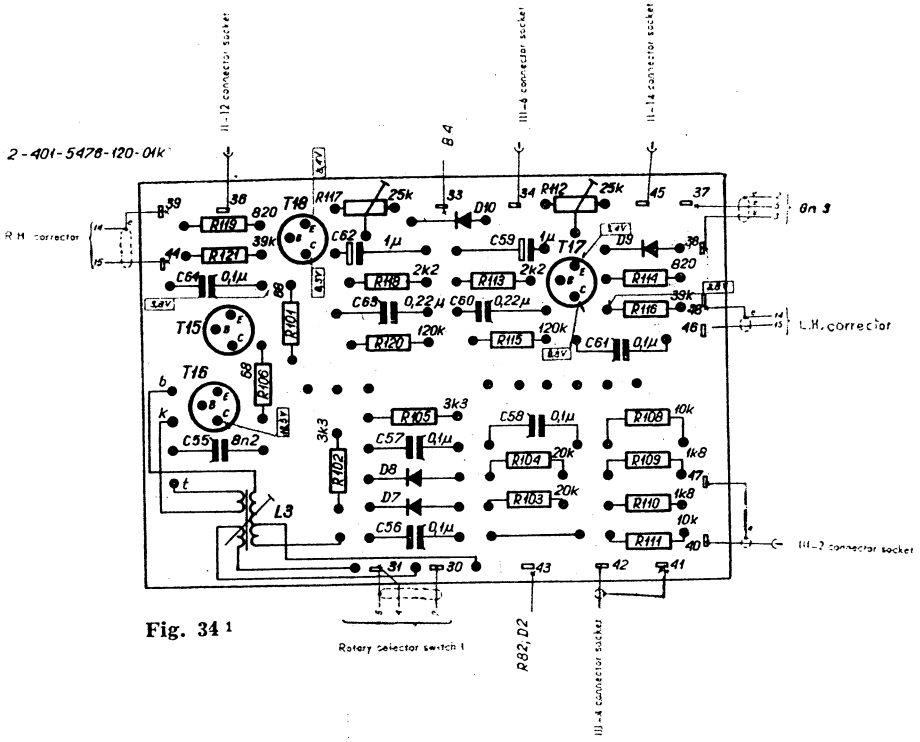


Fig. 34 [1]

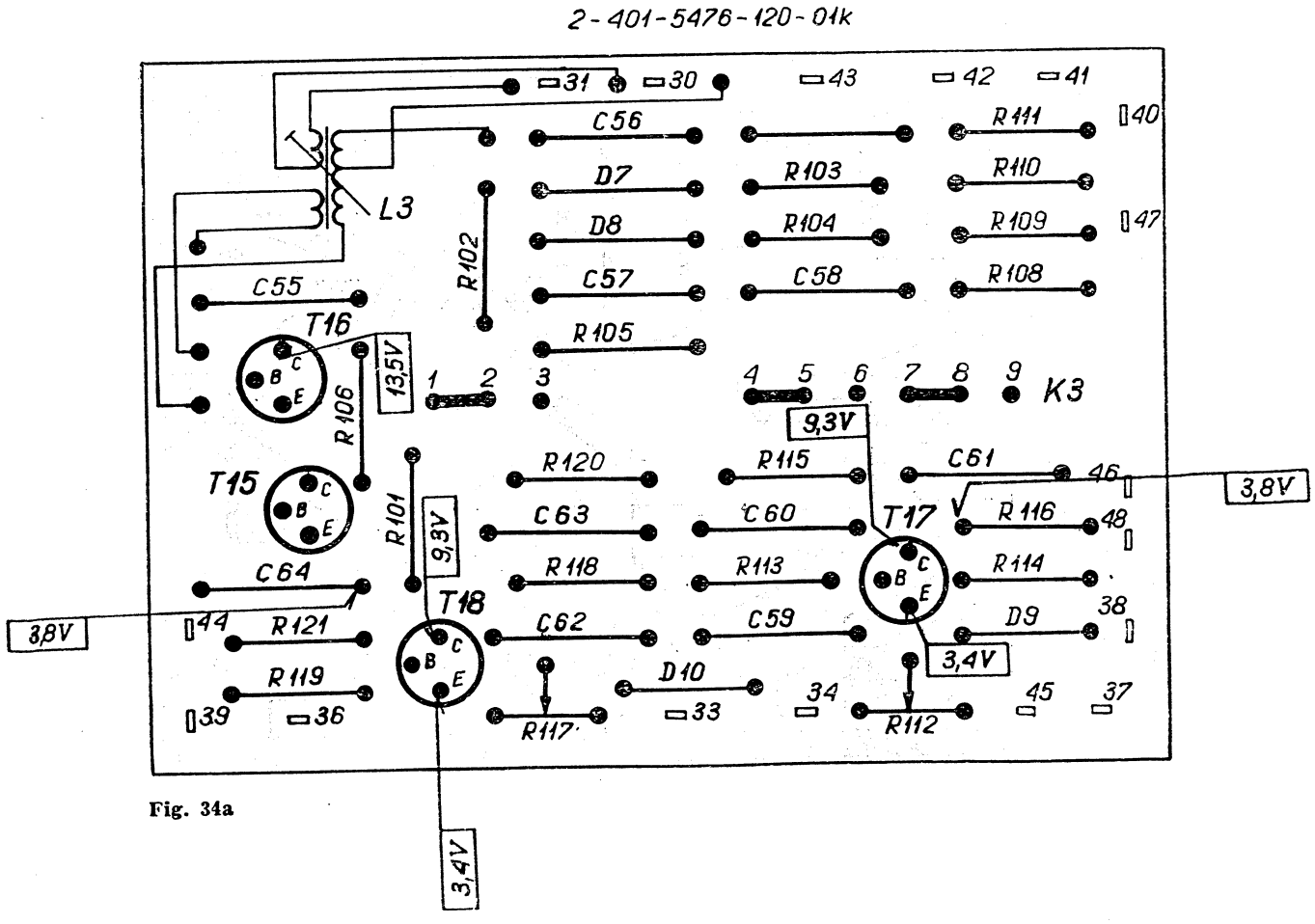
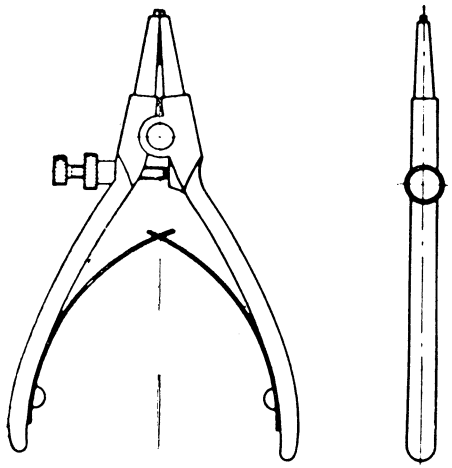
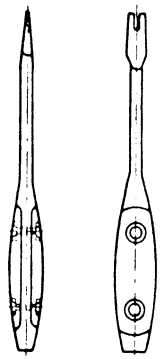


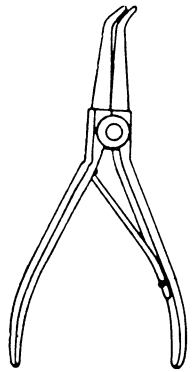
Fig. 34a



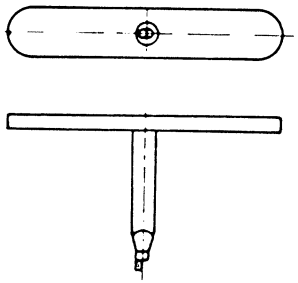
UT3 - PX - 199
Special purpose pliers



9T3 - PX - 650
Special screwdriver



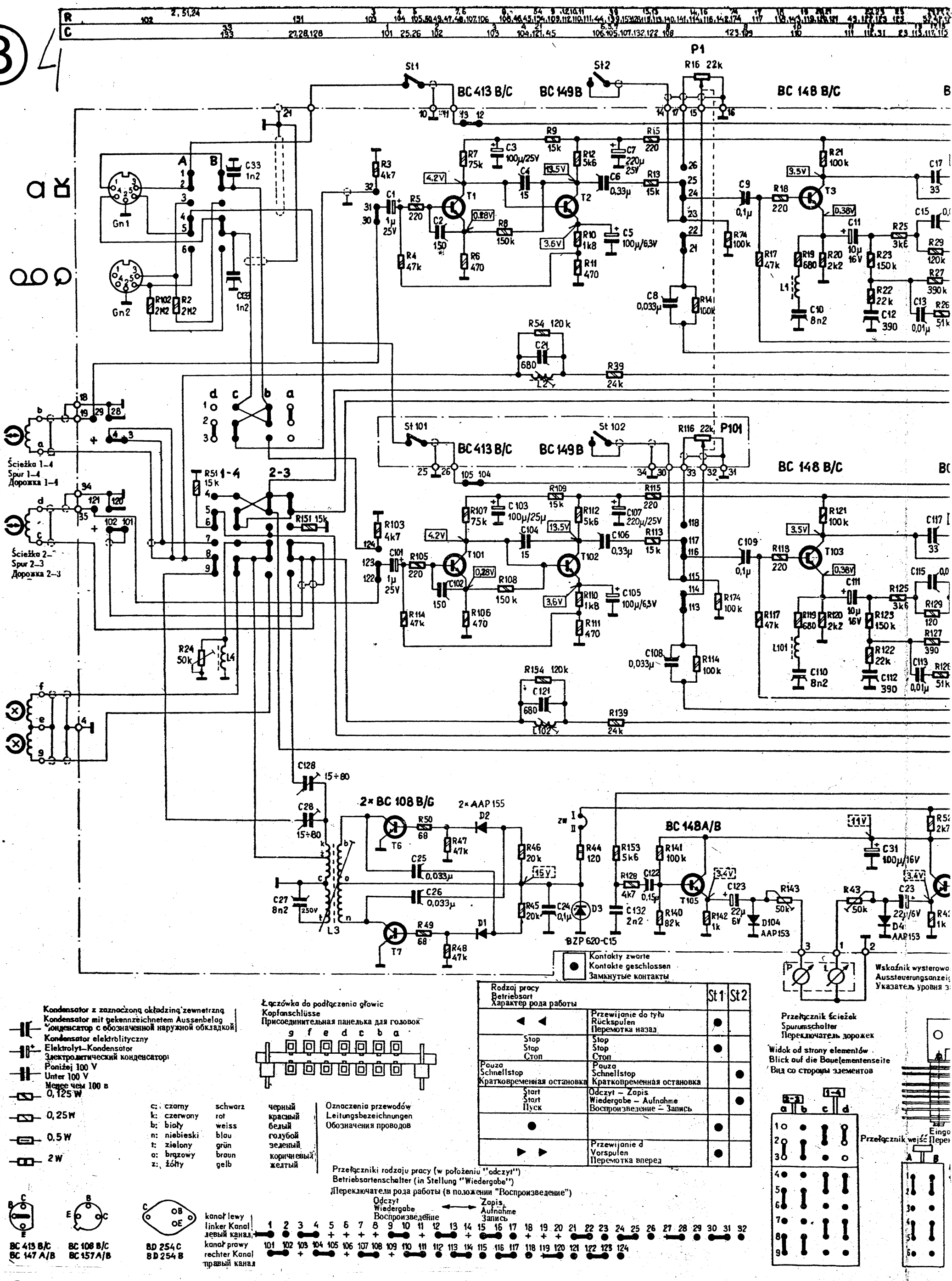
RSKm - 125/A
External snap pliers for lock rings



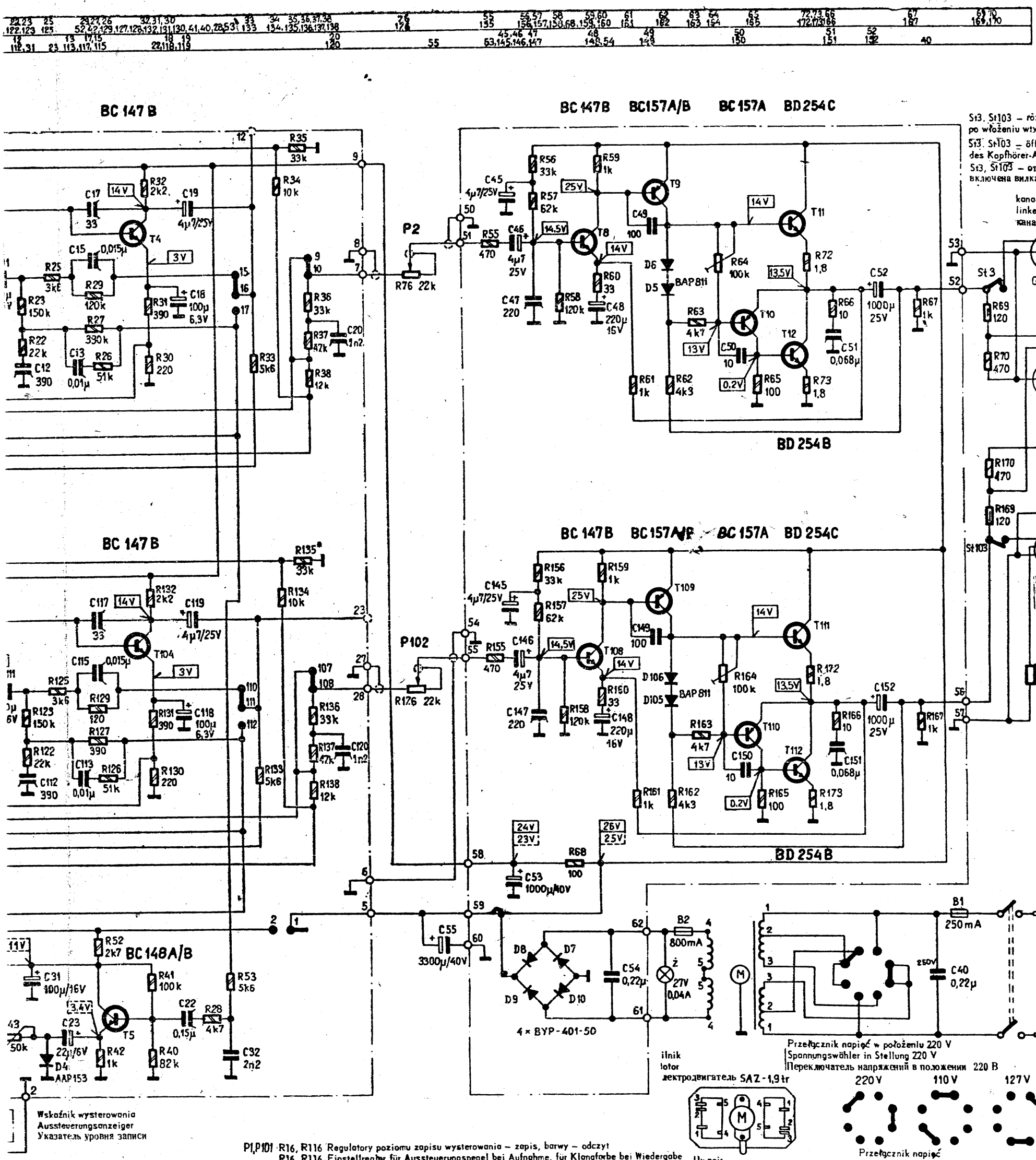
3NX - 694
Adjustment key

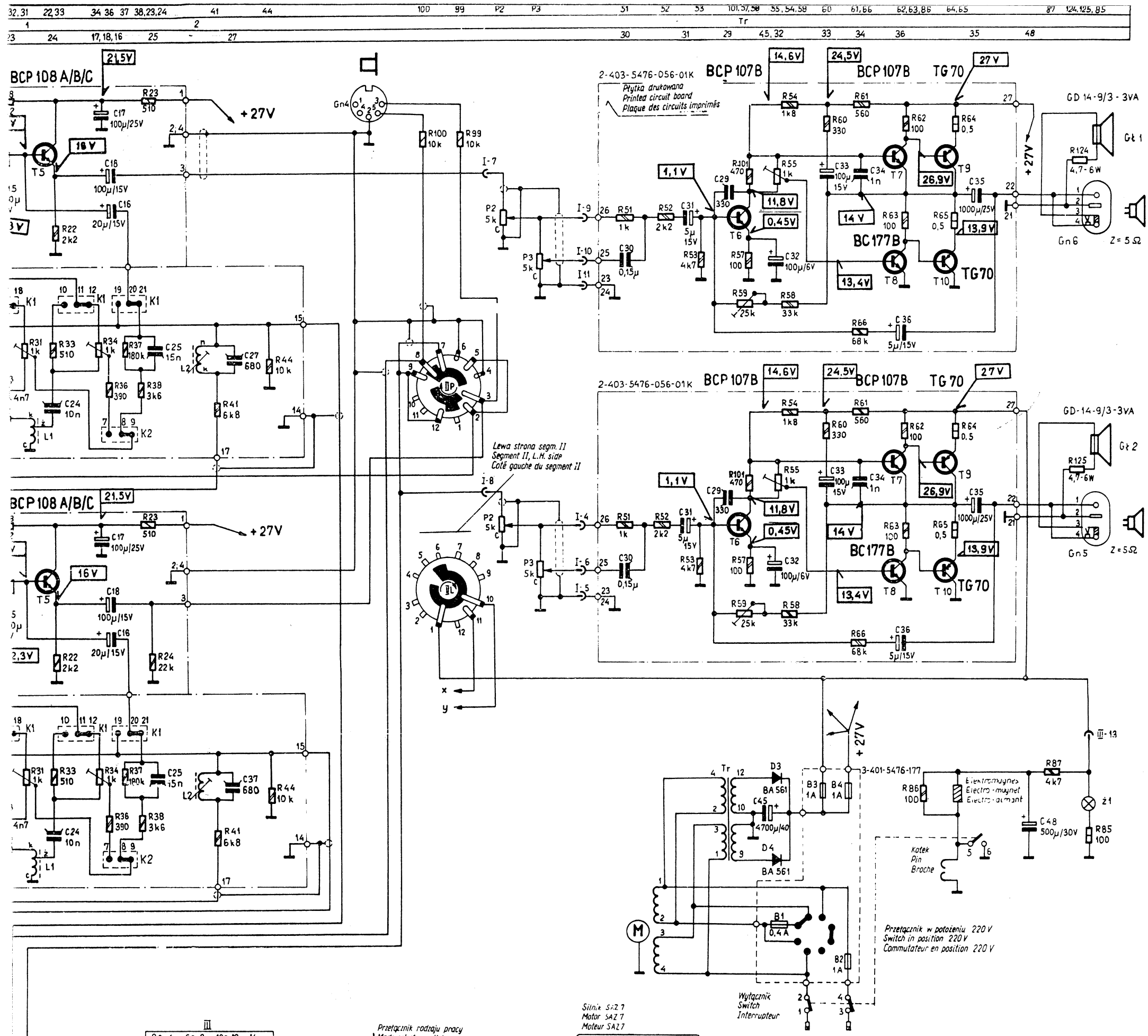
UT3 - PX - 533
Trimmer turning

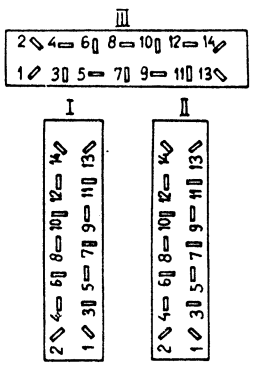
Fig. 35

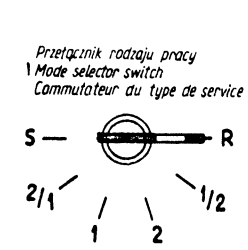


③ Schemat ideowy szpulowego, stereofonicznego magnetofonu ZK-146


BC 147 B
BC 147B BC157A/B BC 157A BD 254C
BD 254B
BC 148A/B
P2
P102
R76 22k
R176 22k
St3, St103 – rozłączone po włożeniu wtyku słuchawki
St3, St103 – öffnen beim Einführen des Kopfhörer-Anschlusssteckers
St3, St103 – отключены, если включена вилка головного телефона
kanał lewy
linker Kanal
канал левый
kanał prawy
rechter Kanal
канал правый
Gn 4
Gn 5
Gn 3
Z=8Ω
Z=15Ω
Gł
GD 10-16/4
St3
St103
B1
250 mA
B2
800mA
27V
0,04A
4 × BYP-401-50
Sieć
Netz
Сеть
Przełącznik napięć w położeniu 220 V
Spannungswähler in Stellung 220 V
Переключатель напряжений в положении 220 В
ilnik
lotor
лектродвигатель SAZ-1,9 tr
220V
110V
127V
Przełącznik napięć
Spannungswähler
Переключатель напряжений
Wskaźnik wysterowania
Aussteuerungsanzeiger
Указатель уровня записи
Przełącznik wejść
Eingangswahlschalter
Переключатель входов
RADIO
MIKROFON
GRAMOFON
MAGNETOFON
PLATTENSPIELER
TONBANDGERÄT
ЭЛЕКТРОФОН
МАГНИТОФОН
RADIO
MIKROPHON
РАДИОПРИЕМН
МИКРОФОН
P1,P101 R16, R116 Regulatory poziomu zapisu wysterowania – zapis, barwy – odczyt
R16, R116 Einstellregler für Aussteuerungspegel bei Aufnahme, für Klangfarbe bei Wiedergabe
R16, R116 Регуляторы уровня настройки – запись, тембра – воспроизведение
P2,P102 R76, R176 Regulatory głośności
R76, R176 Einstellregler für Lautstärke
R76, R176 Регуляторы громкости
R43, R143 Regulatory napięcia wysterowania wskaźnika
St 101 R43, R143 Einstellregler für Aussteuerungsanzeiger
R43, R143 Регуляторы напряжения настройки индикатора
St 1 R64, R164 Regulatory punktu pracy stopnia końcowego
St 2 R64, R164 Stellpotentiometern Endstufen-Arbeitspunkt
St 102 R64, R164 Регуляторы рабочей точки конечного каскада
R24 Regulator układu zastępczego głowicy
R24 Einstellregler für Kopf- Ersatzschaltung
R24 Регулятор эквивалентной системы головки
C28, C128 Trymery do ustawienia prądu podkładu
C28, C128 Trimmer-Kondensatoren für Vormagnetisierungsspannung
C28, C128 Подстроечные конденсаторы для установки тока
Uwagi:
Bemerkungen:
Примечание:
1. W wykonaniu na napięcia 220 V; 220 110 V i 220 127 V obowiązują połączenia aktualne dla danych napięć
1. In Ausführungen für 220V; 220 110V und 220 127V gelten jeweils die Anschlüsse für entsprechenden Spannungen
1. В исполнениях на напряжения 220 В, 220 110 В и 220/127 В обязательны соединения относящиеся к данным напряжениям
2. Wszystkie gniazda pokazano od strony montażu
2. Alle Buchsen von der Montageseite aus gesehen
2. Все присоединительные гнезда показаны со стороны монтажа
3. Napięcia mierzone w stosunku do masy bez sygnału przyrządem 20 kΩ/V w położeniu
3. Spannungsmessung ohne Signal mit 20 kOhm/V-Spannungsmesser in Stellung
3. Напряжения измеряемые по отношению к корпусу без наличия сигнала, прибором с входным сопротивлением 20 кОм/В в положении
Odczyt
Wiedergabe
Воспроизведение
Zapis
Aufnahme
Запись
4* R135 Rezystor dobierany przy kontroli wzmocnienia toru odczytu
4* R135 Bei der Eichkontrolle der Verstärkung des Wiedergabekanals gewählter Widerstand
4* R135 Резистор подбираемый при контроле усиления канала воспроизведения
Zastrzega się możliwość wprowadzenia zmian w schemacie
Änderungen im Schaltbild vorbehalten
Оставляем за собой право вводить изменения в схе







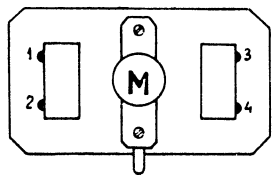
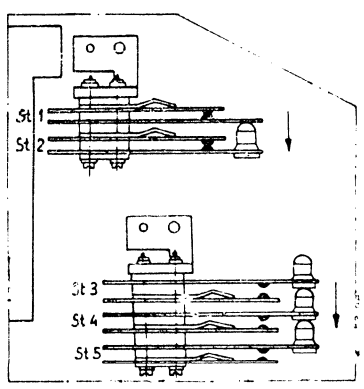


Tabela połączeń przełącznika rodzaju pracy
Connection table of mode selector switch
Tableau des connexions du commutateur du type de service

Praca / Performance mode / Service		STEREO STEREO STEREO	2/1	1	2	1/2	R
I	Segm.	7-8/9-10/11/12	6-7-10/11/12	6-7-10/11/12	6-7-8/9	6-7/8/9	6-7
	Segm.						
	Segm.						
II	Segm.	–	8-9/12/7	7-8	7-8	7-8-9/12	7-8
	Segm.	3-7/9	3-2/5	–	–	3-2/5	–
	Segm.	1-11	1-10	1-10	1-10	1-10	1-10
III	Segm.	10-12	10-12	10-12	6-10	6-10	3/4-6
	Segm.	3/4-5/2-6	3/4-5/2-6	3/4-5/2-6	2/5-3/4-12	5/2-3/4-12	5/2-3/4-10-12
	Segm.						
IV	Segm.	10-12	8/11-10-12	10-12	6-10	6-10-8/11	3/4-6
	Segm.	3/4-6	3/4-6	3/4-6	3/4-12	3/4-12	3/4-10-12
	Segm.	–	1-2	1-2	1-2	1-2	1-2



Rodzaj pracy / Performance mode / Type de service	St 1	St 2	St 3	St 4	St 5
Start / Start / Mise en marche			●	●	●
Przewijanie w lewo (do tyłu) / Fast rewinding / Bobinage vers la gauche (en arrière)	●	●			
Przewijanie w prawo (do przodu) / Fast forward winding / Bobinage vers la droite (en avant)	●	●			
Stop / Stop / Stop	●	●			
Zapis / Recording / Enregistrement					

● Kontakty zwarte / Closed contacts / Contacts court-circuités

1. Przełączniki K1, K3 – przełącznik „zapis – odczyt"
1. K1, K3 switch – selector switch „recording – playback"
1. Commutateur K1, K3 – commutateur „enregistrement – reproduction"
2. Przełącznik K2 oraz St6, Wył. – sterowane gałką przełącznika prędkości
2. K2 switch, St6 contact, OFF – controlled by means of speed selector switch knob
2. Commutateur K2 et St6, Interrupteur – commandés par le bouton du commutateur des vitesses
3. Styki St1, St2, St3, St4, St5 – przełącznik „start" (odczyt)
3. Contacts St1, St2, St3, St4, St5 – switch „start" (playback)
3. Contacts St1, St2, St3, St4, St5 – commutateur „marche" (reproduction)
4. Zadziałanie elektromagnesu (EL) powoduje powrót magnetofonu w poz. „stop"
4. Electromagnet (EL) action effects tape recorder return to position „stop"
4. Le fonctionnement de l'électroaimant (EL) engendre le retour du magnétophone en position „stop"
5. Napięcia stałe mierzono bez sygnału przyrządem 100 kΩ/V
5. D.C. voltages measured without signal, by means 100 kOhms/V instrument
5. Tensions continues mesurées sans signal par appareil 100 kΩ/V
6. W wykonaniu tylko na napięcie 220 V nie stosuje się przełącznika napięć
6. If tape recorder adapted for 220 V only – no voltage selector switch is provided
6. En variante pour 220 V seulement, le commutateur de tension n'est pas utilisé
7. Wszystkie gniazda pokazano od strony montażu
7. All sockets shown from the internal connections side
7. Toutes les prises sont montrées du coté de montage
8. Tranzystory T7 i T8 – para komplementarna
8. Transistors T7, T8 – complementary pair
8. Transistors T7 et T8 – paire complémentaire
9. Przełączniki na schemacie ustawione w pozycji: odczyt, R, prędkość przesuwu 19 cm/s
9. Selector switches in diagram in positions: playback, R, Speed 19 cm/sec
9. Commutateurs placés sur le schéma en position: reproduction, R, vitesse d'avance 19 cm/s

Zastrzega się możliwość zmian w schemacie
Modifications in diagram reserved
Nous nous réservons le droit d'introduire des modifications dans le schéma

Schemat magnetofonu STEREO ZK-246
Diagram of STEREO TAPE RECORDER ZK-246
Schéma du magnétophone STEREO ZK-246

| | | |

I connector plug

P1 P

P1 L

I connector plug

P3 P

P3 L

P2 P

P2 L

I connector plug

I connector plug

ZP–14 connector

Plate with trimmers

II connector plug

4-401-5476-125-011

Connector plug

Universal head

Track 3

Track 1

St 1

St 2

Segm. IV

R91

C51

Segm. III

M–R selector switch

Gn 6

Gt 1

R124

Gn 5

R125

Gt 2

Mains 220 V

Mains switch

L.H. power amplifier

R.H. power amplifier

B4

B1 B2 B3

Rotary selector switch

+C45

Chassis

Mains transformer 403-4247-296-02K

Track 3

Erasing head

Track 1

Segm. I

R122

Generator

III connector socket

I–8 connector socket

Segm. II

III connecior socket

L.H. corrector

R.H. voltage amplifier

M–R selector switch

L.H. corrector

R.H. corrector

Gn 1

Chassis

Rotary switch – segment IV

Gn 2

Mains transformer

C45

Chassis

III–13 connector plug

R87

R86

Electromagnet

C43

B1

R85

Pin

Motor SAZ 7

I connector socket

L.H. power amplifier

2-403-5476-056-01K

R124

Gt 1

Gn 6

M–R selector switch

Gn 1

M–R selector switch

Generator

R89

R35

R94

R88

R93

R95

Gn 2

Gn 3

R.H. voltage amplifier

L.H. voltage amplifier

R160

R99

Gn 4

I connector socket

R.H. power amplifier

2-403-5476-056-01K

R 125

Gt 2

Gn 5

I connector socket

M–R selector switch

R.H. corrector

2-403-5476-051-034

Generator

R.H. voltage amplifier

2-403-5476-052-014

Rotary switch – segment II

R99

Gn 4

I connector socket

Rotary switch – segment II

L.H. corrector

2-403-5476-051-026

Generator

M–R selector switch

L.H. voltage amplifier

2-403-5476-052-022

I–7 connector socket

R100

Gn 4

Gn 3

L.H. corrector

III–2 connector socket

II–14 connector socket

III–6 connector socket

B4

II–12 connector socket

Generator

III–1 connector socket

R62, D2

Rotary switch – segment I

2-401-5476-120-01K

R.H. corrector

Circuit Diagram

4-403-5476-059-027 BC 413 B/C BC 413 B/C BCP 108 B/C BCP 108 C BCP 108 A/B/C

4-403-5476-059-035 BC 413 B/C BC 413 B/C BCP 108 B/C BCP 108 C BCP 108 A/B/C

4-401-5476-125-01K

2-401-5476-120-01K

MIKRO-RADIO
МИКРО-РАДИО
MIKRO-RADIO

Lewa strona segm. IV
Левая сторона сегмента IV
IV Segment linke Seite

Wskaźnik L
Уровень записи левого канала
Anzeigeinstrument linker Kanal

Wskaźnik P
Уровень записи правого канала
Anzeigeinstrument rechter Kanal

BCP 108B BCP 108B BCP 108A BCP 108A

Wąsiki oznaczają okładzinę zewnętrzną
Усики обозначают наружную обкладку
Aussenbelag gestrichelt

*Kondensator elektrolityczny
Электролитический конденсатор
Elektrolytkondensator

Poniżej 100 V
Менее 100 b
Unter 100 V

0,125 W
0,25 W
1 W
2 W

TRANZYSTORY
ТРАНЗИСТОРЫ
TRANSISTOREN

BC 413B, BC 177B
BCP 107, 108 A|B|C

TG 70

Zapis
Запись
Aufnahme

Odtwarzanie
Воспроизведение
Wiedergabe

Odtwarzanie
Воспроизведение
Wiedergabe

Zapis
Звукозапись
Aufnahme

Przełącznik napięć
Переключатель напряжений
Spannungswahlschalter

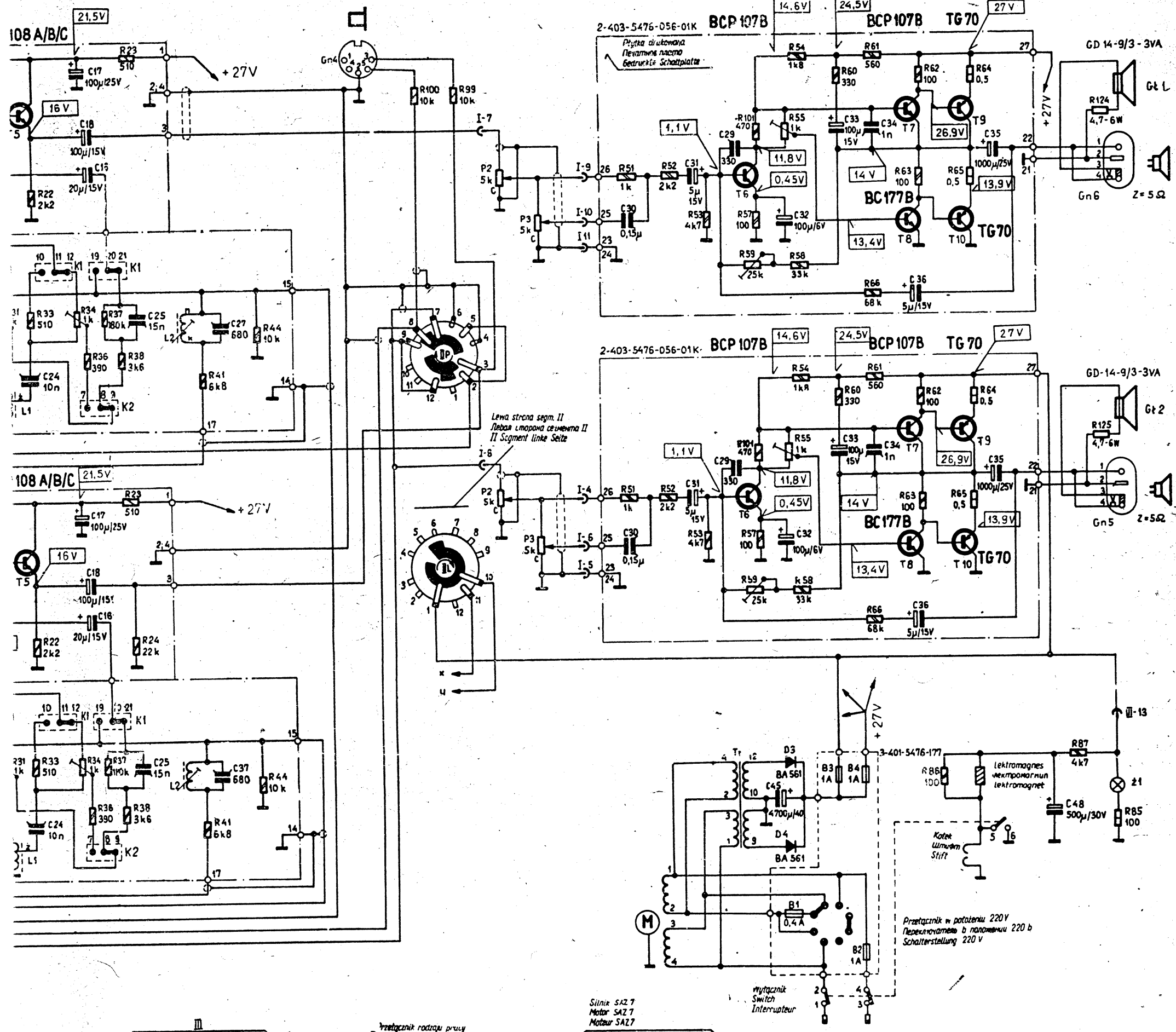
R31 – przy prędkości przesuwu 19 cm/s
R31 – при скорости передвижения ленты 19 см/сек
R31 – bei Bandgeschwindigkeit 19 cm/s
R34 – przy prędkości przesuwu 9,5 cm/s
R34 – при скорости передвижения ленты 9,5 см/сек
R34 – bei Bandgeschwindigkeit 9,5 cm/s
R55 – Regulator prądu spoczynkowego stopnia mocy
R55 – Регулятор начального тока каскада мощности
R55 – Endstufen – Nullstrompotentiometer
R59 – Regulator symetrii wysterowania stopnia mocy
R59 – Регулятор симметрии запуска каскада мощности
R59 – Endstufen – Symmetriepotentiometer
R112 – Regulator ustawienia wskaźnika wysterowania lewego kanału
R112 – Регулятор установки уровня записи левого канала
R112 – Stellpotentiometer für Aussteuerungsanzeiger – linker Kanal
R117 – Regulator ustawienia wskaźnika wysterowania prawego kanału
R117 – Регулятор установки уровня записи правого канала
R117 – Stellpotentiometer für Aussteuerungsanzeiger – rechter Kanal
C49 – Regulator prądu podkładu ścieżki 1 - 4
C49 – Регулятор тока подмагничивания дорожки 1 - 4
C49 – Vormagnetisierungsstrom, Spur 1 - 4
C50 – Regulator prądu podkładu ścieżki 2 - 3
C50 – Регулятор тока подмагничивания дорожки 2 - 3
C50 – Vormagnetisierungsstrom, Spur 2 - 3

Regulatory charakterystyki wzmacniacza odczytu w zakresie wyższych częstotliwości
Регуляторы характеристики усилителя воспроизведения в диапазоне высших частот
P1 Verstärker – Kennliniensteller im Bereich der hohen Frequenzen

P1 – Potencjometr poziomu zapisu
P1 – Потенциометр уровня записи
P1 – Aufnahmepegelregler
P2 – Potencjometr siły głosu
P2 – Потенциометр силы звука
P2 – Lautstärkenregler
P3 – Potencjometr barwy dźwięku
P3 – Потенциометр тембра звука
P3 – Klangfarbenregler

c:	czerwony	красный	rot
n:	niebieski	синий	blau
ż:	żółty	жёлтый	gelb
b:	biały	белый	weiss
z:	zielony	зелёный	grün
c:	czarny	чёрный	schwarz

Zastrzega się możliwość zmian
Оставляем за собой право на из
Änderungen im Schaltbild vor



1. Przełączniki K1, K3 – przełącznik „zapis – odczyt"
1. Переключатели K1, K3 – переключатель „запись – воспроизведение"
1. Schalter K1, K3 – „Aufnahme – Wiedergabe"
2. Przełącznik K2 oraz St6, Wył. – sterowane gałką przełącznika prędk.
2. Переключатель K2 и St 6. Выкл. – управление кнопкой переключателя скорости
2. Schalter K2 und St6, Aus – Betätigung vom Bandgeschwindigkeitsumschalter
3. „Łyki St1, St2, St3, St4, St5 – przełącznik „start" (odczyt)
3. Контакты St1, St2, St3, St4, St5 – переключатель „пуск" (воспроизведение)
3. Kontaktfedern St1, St2, St3, St4, St5 – Schalter „Start" (Wiedergabe)
4. Zadziałanie elektromagnesu (El) powoduje powrót magnetofonu w poz. „stop"
4. Срабатывание электромагнита (El) вызывает возвращение магнитофона в положение „стоп"
4. Ein Ansprechen des Elektromagnets (El) verursacht eine Rückkehr in die „Stop"-Lage
5. Napięcia stałe mierzono bez sygnału przyrządem 100 kΩ/V
5. Постоянные напряжения измеряемые без сигнала прибором 100 ком/в
5. Gleichspannungen ohne Eingangssignal gemessen. Eingangswiderstand des Instruments 100 kOhm/V
6. W wykonaniu tylko na napięcie 220V nie stosuje się przełącznika napięć
6. В исполнении только на напряжение 220 в не применяется переключатель напряжений
6. Bei Ausführung nur für 220V fehlt der Netzspannungsumschalter
7. Wszystkie gniazda pokazano od strony montażu
7. Все присоединительные гнезда показаны со стороны монтажа
7. Alle Buchsen von der Montageseite aus gesehen
8. Tranzystory T7 i T8 – para komplementarna
8. Транзисторы T7 и T8 – дополнительная пара
8. Transistoren T7 und T8 – Komplementärpaar
9. Przełączniki na schemacie ustawione w pozycji: odczyt R, prędkość przesuwu 19 cm/s
9. Переключатели на схеме установлены в положении: воспроизведение R, скорость передвижения ленты 19 см/сек
9. Schalterstellungen gelten für Wiedergabe R, Bandgeschwindigkeit 19 cm/s

④ Schemat ideowy szpulowego, stereofonicznego magnetofonu ZK-246